

The National Commission for Colleges of Education (NCCE)

Regulator of teacher education in Nigeria — advancing quality, standards, and institutional growth nationwide.

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Professor Paulinus Chijioke Okwelle, MNAE, FABEN —

A visionary Executive Secretary and pillar of educational transformation in Nigeria

Advancing Education, Empowering Generations

Celebrating Professor Paulinus Chijioke Okwelle MNAE, FABEN

Executive Secretary

National Commission for Colleges of Education (NCCE)



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Advancing Education, Empowering Generations

A Tribute to the Vision, Leadership, and Enduring Legacy



Professor Paulinus Chijioke Okwelle

Executive Secretary

National Commission for Colleges of Education (NCCE)

For a life that taught, a mind that led, and a heart that inspired — shaping teachers, transforming classrooms, and empowering generations to come.

Copyright Page

Advancing Education, Empowering Generations: *Celebrating Professor Paulinus Chijioke Okwelle,* Executive Secretary, National Commission for Colleges of Education

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"He who opens a school door, closes a prison."
— Victor Hugo

"Knowledge is like a garden; if it is not cultivated, it cannot be harvested."
— African Proverb

"Akwụkwọ bụ ụzọ e si amata ụwa."
("Books are the pathway to understanding the world." *— Igbo Proverb****)***

"The function of leadership is to produce more leaders, not more followers."
— Ralph Nader

"Onye nkuzi bụ onye na-eme ka ndị ọzọ too."
("The teacher is the one who makes others grow." *— Igbo Proverb****)***



Champion of quality education, custodian of professional standards, and a torchbearer for generations of Nigerian teachers

Dedication

This book is dedicated to the torch-bearers of learning — the Teachers — those who rise before dawn to shape young minds,who plant seeds they may never live to harvest, and who, with chalk and courage, build generations greater than their own. We dedicate it to education as a sacred calling, a noble labour that transforms societies and grants wings to dreams. We dedicate it to leadership that listens, guides, and uplifts, the kind embodied by Professor Paulinus Chijioke Okwelle — scholar, reformer, institution-builder, and steward of the teacher's future. His life reminds us that education is the golden bridge between today and tomorrow; that leadership is not power, but responsibility; and that one enlightened mind can light the lamps of a thousand more.Here, therefore, is a tribute not only to a man, but to a movement — a legacy in motion —advancing education, empowering generations.

Foreword

Education is the quiet force that shapes nations and steers humanity forward. It is the architecture of civilisation, the wellspring of innovation, and the enduring inheritance we pass to generations yet unborn. In every age, there arise men and women who do not merely participate in the enterprise of learning, but *advance it* — those who stretch the boundaries of what is possible, who reform with vision, who lead with wisdom, and who carry the lantern high enough for millions to see their way.

Professor Paulinus Chijioke Okwelle stands among such distinguished luminaries. As Executive Secretary of the National Commission for Colleges of Education (NCCE), he has not only championed teacher education but redefined it for the future. His leadership is marked by courage, clarity, depth of intellect, and an unwavering commitment to standards, relevance and global competitiveness. He has been a bridge between policy and practice, between teaching and transformation, between the present and the possibilities ahead.

This Festschrift — *Advancing Education, Empowering Generations* — is therefore more than a scholarly volume. It is a monument of ideas, a compendium of reflections, a living archive of the values and vision embodied by Professor Okwelle. It gathers the voices of academics, researchers, thinkers, reformers and witnesses of his journey, all united in one intellectual salute. Here, we do not only celebrate the man; we honour the movement he represents — a movement of excellence, integrity, service and educational rebirth.

The papers contained within these pages stretch across disciplines, sectors and philosophies. They interrogate, inspire, provoke thought, question norms, and point towards newer heights. They remind us that teacher education must evolve, that leadership must remain ethical and responsive, and that reform is neither a moment nor an event — but a continuous, courageous march.

To write about Professor Okwelle is to write about conviction clothed in humility, authority exercised with humanity, and brilliance delivered with grace. His work will outlive his tenure. His influence will outlast his time in office. His footprints will guide those who come after, as surely as stars guide ancient travellers across the night.

May this Festschrift inspire deeper inquiry.
May it strengthen the hands of those who teach.
May it affirm the truth that **education, when properly stewarded, empowers generations beyond measure.**

I congratulate the Editorial Board and every contributor to this noble work.
And I bow in respect to the man whose legacy it immortalises.

Long may knowledge thrive. Long may teaching lead.
Long may this light continue to shine.

Prologue Reflections

Advancing Education, Empowering Generations: The Transformative Leadership of Professor Paulinus Chijioke Okwelle, MNAE, FABEN

In the vast and evolving landscape of Nigerian education, certain leaders do more than administer—they illuminate pathways, awaken potential, and transform institutions into beacons of hope. Professor Paulinus Chijioke Okwelle stands among these rare visionaries. As Executive Secretary of the National Commission for Colleges of Education (NCCE), he has reimagined teacher education in Nigeria, marrying scholarship, strategy, and humanity into a legacy that empowers generations.

From his early beginnings in Ogbakiri-Ikwerre, Rivers State, to the pinnacle of national educational leadership, Professor Okwelle's journey has been one defined by dedication, intellect, and an unwavering commitment to service. With a B.Sc. in Technical Education, a Master's degree in Education, a PGD in Electrical Engineering, and a Ph.D. in Technical Education, his academic grounding mirrors the depth and breadth of the reforms he has championed. Through decades of lecturing, departmental leadership, and professorial duties, he cultivated a profound understanding of pedagogy, curriculum design, and institutional governance—preparing him to lead with insight, foresight, and integrity.

Under his stewardship, the NCCE has emerged not merely as a regulatory body, but as a transformative force for teacher education in Nigeria. Professor Okwelle has spearheaded a comprehensive curriculum overhaul across Colleges of Education, ensuring that the programs reflect global best practices while remaining responsive to local realities. He has championed the infusion of digital literacy, information and communication technology, and contemporary pedagogical strategies into teacher training, equipping educators to meet the demands of twenty-first-century classrooms.

Yet, beyond policy reforms and technological integration, it is the human touch of his leadership that distinguishes Professor Okwelle. Harmonising vision with empathy, he has cultivated a culture of collaboration, professional dignity, and ethical stewardship across institutions. His efforts to enhance welfare, nurture talent, and

build partnerships with development agencies, government entities, and international organisations have elevated the teacher education sector to new heights.

This Festschrift is not merely a record of administrative milestones; it is a celebration of influence, impact, and inspiration. Each chapter reflects the ripple effects of his transformative leadership—from curriculum reform and institutional innovation to mentorship, advocacy, and the empowerment of teachers across Nigeria. Through these collected writings, the reader witnesses education as a living, evolving enterprise—shaped by vision, anchored in evidence, and propelled by the unyielding belief in the potential of every learner and educator.

Advancing Education, Empowering Generations honours a man whose stewardship demonstrates that true leadership lies not in titles, but in lives touched, systems strengthened, and horizons expanded. It is a testament to the enduring power of education to illuminate minds, shape societies, and cultivate generations prepared to meet the challenges of tomorrow.

May these pages inspire educators, scholars, policymakers, and all who hold the flame of learning high—to advance boldly, to empower fully, and to transform relentlessly.

"Education is not a preparation for life; it is life itself. And those who guide it with wisdom shape the destiny of nations."

In Honour of Professor Paulinus Chijioke Okwelle.

Preface

Every great story deserves a witness. Every legacy deserves a record. And every era of leadership — especially one that transforms the future of learning — must be preserved in ink, not memory alone.

This Festschrift emerges as a scholarly tribute to **Professor Paulinus Chijioke Okwelle**, a man whose name has become synonymous with teacher education reform, academic quality assurance and national development through knowledge. At a time when many systems struggle for stability and relevance, his tenure at the National Commission for Colleges of Education (NCCE) has been marked by clarity of purpose, renewal of standards, institutional strengthening, and a grounding belief that *teachers are the seed of every nation's tomorrow.*

The theme — **Advancing Education, Empowering Generations** — is not merely descriptive; it is prophetic. It speaks of a lifetime spent nurturing minds, building institutions, reforming structures and mentoring those who now lead classrooms across Nigeria and beyond. It calls attention to education not as policy alone, but as destiny — shaping economies, culture, citizenship, equity, innovation and nationhood. This book was conceived to document that journey, honour that conviction, and inspire those who will inherit the mantle.

The contributions gathered here span research, conceptual analyses, policy reflections, philosophical critiques, and creative expressions — each illuminating a facet of Professor Okwelle's impact. Some chapters expand the frontiers of pedagogy, curriculum, teacher professionalism and digital transformation. Others capture moments, stories, testimonies and quiet truths from those who have walked with him, learned from him, or been shaped by his example. Together, they weave a tapestry of thought, scholarship and memory — both intellectual and deeply human. This Festschrift is not the end of a tenure; it is the beginning of a legacy.

Not a closing chapter, but a launchpad for new dreams.

Not only a celebration, but a challenge — that we must not stop where he stops, but **rise where he stood**.

To everyone who contributed to this volume, we extend profound gratitude — to the scholars whose papers enrich these pages, to the reviewers whose eyes strengthened each work, and to the editorial team whose diligence refined vision into reality.

And above all, to **Professor Paulinus Chijioke Okwelle** —
for teaching us that leadership is service,
that education is power when rightly directed,
and that one life faithfully lived can empower generations.
This book is offered to history with admiration, pride, and hope.

Joy Eyisi
For and on behalf of the Editors

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Joy Eyisi is a professor of English, trailblazing scholar, visionary educator, and transformative leader whose work has redefined English studies and open distance learning in Nigeria and beyond. She currently serves as Chairperson, Committee of Deans and Directors, and Director of the Students' Industrial Work Experience Scheme (SIWES) at the National Open University of Nigeria (NOUN), where her leadership continues to inspire excellence and innovation. A pioneer in academic administration, she was the founding Director of NOUN's Special Study Centre for the National Assembly and later became the first female Deputy Vice-Chancellor of the University. Her academic journey reflects brilliance, discipline, and unyielding commitment: she holds two Master's degrees—in Educational Administration and Supervision from Nnamdi Azikiwe University, Awka, and in English from the University of Nigeria, Nsukka—alongside two doctoral degrees: a PhD in English from the University of Nigeria, Nsukka, and a PhD in Open and Distance Learning from the University of Ibadan. Rising swiftly through the ranks, she became the youngest professor at Nnamdi Azikiwe University, exemplifying her dedication to scholarship, mentorship, and innovation. Professor Eyisi's influence extends globally, having distinguished herself as the first Nigerian recipient of the prestigious Best Paper Presenter Award at the International Academy of Linguistics, Behavioural, and Social Sciences in New Orleans, USA. Guided by her personal credo, *"Aspire to the zenith. Never settle for Very Good where Excellent is possible,"* she continues to illuminate pathways for learners, empower emerging scholars, and shape the future of education with visionary insight, integrity, and boundless passion. As Editor-in-Chief, she conceptualised the Festschrift, guided the editorial vision, coordinated contributors, and ensured the thematic coherence, intellectual rigour, and scholarly excellence that make this volume a fitting tribute to Professor Paulinus Chijioke Okwelle.



Professor Charles Chikwendu Okpala is a distinguished Nigerian scholar, visionary researcher, and leading authority in Industrial and Production Engineering, whose work has shaped the frontiers of sustainable manufacturing, cyber-technology, lean systems, and smart maintenance innovations. He holds a B.Eng. in Mechanical/Production Engineering from Enugu State University of Science and Technology, an M.Sc. in Engineering Business Management from the University of Warwick, and both an MBA and PhD from Nnamdi Azikiwe University, Awka. Professor Okpala has taught, researched, and innovated extensively, earning a competitive Research Fellowship at Brunel University, London, and establishing himself as one of Nigeria's foremost voices in modern production engineering and systems optimisation. With numerous journal publications, industry-linked research projects, and patented engineering solutions, his scholarship combines rigour, innovation, and practical impact. For this Festschrift, Professor Okpala brought unparalleled technical expertise, ensured structural clarity, and infused the volume with interdisciplinary depth, providing robust analytical perspectives and professional engineering insight that complement and elevate the scholarly excellence of the tribute. His contributions underscore the precision, innovation, and intellectual strength that make this volume a fitting celebration of Professor Paulinus Chijioke Okwelle's legacy.



Professor Geraldine Ifesinachi Nnamdi-Eruchalu

Scholar of language. Voice of clarity. Beacon of stylistic brilliance.

Geraldine Ifesinachi Nnamdi-Eruchalu is a distinguished Professor of Stylistics in the Department of English Language and Literature, Nnamdi Azikiwe University, Awka. A scholar refined in intellect and seasoned by years of academic contribution, she holds a PhD in English Language from the University of Nigeria, Nsukka, Enugu State — a foundation upon which she has built a formidable career in teaching, research, and scholarly engagement. Her academic journey is marked by visibility and impact. She has attended both local and international conferences, presenting insights that extend the boundaries of linguistic thought, stylistic interpretation, and English language pedagogy. Her scholarship is richly documented through extensive publications in reputable local and international journals, and her voice resonates across numerous book chapters that reflect depth, originality, and intellectual courage. A consummate academic leader, Professor Nnamdi-Eruchalu has served her University with commitment and vision. She has coordinated academic programmes, shaping curriculum and nurturing excellence among colleagues and students alike. From 2016 to 2019, she held the distinguished office of Head of the Department of English, where she led with clarity of purpose, administrative competence, and an unwavering dedication to academic growth. She stands today as a respected voice in Nigerian scholarship — a mentor to emerging academics, a custodian of language, and a woman whose intellectual footprints continue to widen paths for others to follow.



Dr. Sheriff Olatunji is a distinguished scholar, visionary educator, and leading authority in English Language Education within the Department of Arts and Social Sciences Education at the National Open University of Nigeria (NOUN). He holds a PhD in English Language Education from the prestigious University of Ibadan and has established himself as a formidable force in academia, shaping minds and advancing knowledge through innovative teaching, rigorous research, and transformative mentorship. A prolific author, Dr. Olatunji has contributed extensively to scholarly discourse through numerous publications in reputable books and journals, while his expertise is recognised internationally via service on the editorial boards of esteemed local and global journals. His research, including pioneering studies on the treatment of phonological content in English language textbooks, continues to advance the frontiers of linguistics, language education, and educational methodology. An active member of prestigious professional bodies—including the International Association of Language Educators (IALE), the English Language Teachers Association of Nigeria (ELTAN), the Education Research and Development Association (ERDA), and the Teachers Registration Council of Nigeria—he also serves as Vice President of ERDA at the Centre for Promoting Education and Research in Humanities and Social Sciences (CPERHS), fostering innovative educational practices. His dedication has earned fellowships at the Ife Institute of Advanced Studies (IIAS) and the World Institute for Peace (WIP), as well as the Education Research and Development Association 2024 Award of Excellence for Teaching, affirming his unwavering commitment to nurturing the next generation of scholars. For this Festschrift, Dr. Olatunji ensured scholarly rigor, enriched the educational and pedagogical dimensions, and provided critical editorial guidance, helping to uphold the intellectual integrity and excellence that make this volume a fitting tribute to Professor Paulinus Chijioke Okwelle.



Joy Chinelo Chukwudolue is a seasoned academic and Business Education specialist in the Department of Arts and Social Sciences Education, National Open University of Nigeria (NOUN), where she also serves as the Assistant Departmental Examination Officer. She obtained her B.Sc in Business Education from the University of Nigeria, Nsukka, and earned both her M.Sc and PhD in Business Education from Nnamdi Azikiwe University, Awka. An active scholar committed to teaching, research, and professional development, she regularly participates in academic conferences, seminars, and workshops and has published scholarly articles in reputable national and international journals. Her research interests include Business Education, entrepreneurship development, and related areas. Dr. Chukwudolue is a registered member of the Association of Business Education of Nigeria (ABEN), the Teachers Registration Council of Nigeria (TRCN), and the Open, Distance and e-Learning Association of Nigeria (ODeLAN), and she continues to contribute meaningfully to the advancement of Business Education and teacher education in Nigeria through her academic and professional engagements.



Dr. Joy Eyisi Jr. is a distinguished scholar, educator, and researcher at the Department of Languages and General Studies, Covenant University, Ota, where she passionately teaches Studies in English. She holds a first-class honours degree in English from Covenant University, an M.Sc. in English Literature from the University of Ibadan, and a PhD in Medical Humanities, integrating literature, healthcare, and human well-being. Her pioneering work explores the therapeutic role of literature and the arts in healthcare, advocating for their potential in psychological, emotional, and physical healing. As an Arts in Medicine Fellow, she promotes the integration of storytelling, poetry, music, and visual arts into medical practice, inspiring healthcare professionals to adopt holistic approaches to healing. An active member of ESAN and AIMF, Dr. Eyisi Jr. contributes to cutting-edge research, policy development, and transformative leadership across education, healthcare, and the arts. A sought-after speaker, mentor, and facilitator, she engages with scholars and professionals to advance interdisciplinary learning and scholarship. For this Festschrift, Dr. Eyisi Jr. brought an interdisciplinary and humanistic perspective, enriching the volume with reflective essays, creative contributions, and insightful narratives, ensuring that the tribute celebrates not only academic excellence but also the humanistic values, mentorship, and transformative spirit embodied by Professor Paulinus Chijioke Okwelle.



Dr. Ifeanyichukwu Meek Eyisi is a distinguished clinical psychologist, multidisciplinary scholar, and emerging leader in mental health research and practice. He holds a Ph.D. in Clinical Psychology, an M.Sc. in Clinical Psychology from Covenant University, and a B.Sc. in Psychology from Nnamdi Azikiwe University. With over six years of professional experience spanning industry, governance, and academia, Dr. Eyisi has contributed significantly to research on mental health, suicidality, and psychosocial wellbeing, with a focus on African populations. A prolific author and innovator, he has published widely in peer-reviewed journals, supervised research projects, and led initiatives such as Eye 2 Paper and M.A.D Designs LLC, demonstrating a rare ability to integrate scientific inquiry with creative and technological solutions. His multidisciplinary expertise spans IT, graphic design, public speaking, and music production, reflecting a holistic approach to human development and wellbeing. An active contributor to professional and community initiatives, Dr. Eyisi combines psychotherapy, skill acquisition, and applied research to advance mental health outcomes, empower individuals, and strengthen societal resilience. For this Festschrift, he provided critical insight, scholarly depth, and editorial guidance, helping to ensure the intellectual integrity, creativity, and excellence of this tribute to Professor Paulinus Chijioke Okwelle.



Mr Lucky Atiati
Instructional Designer (ID), NOUN Press, National Open University of Nigeria (NOUN)

Mr. Atiati earned a B.Sc. in Information Technology from the National Open University of Nigeria (NOUN) and holds a Diploma in Agricultural Engineering from Kaduna Polytechnic. This unique academic blend equips him with the ability to combine technical proficiency with creative innovation, enabling him to approach problem-solving with analytical precision and practical insight.

As an Instructional Designer and Graphics Specialist, he creates impactful and engaging learning resources, translating complex academic and professional content into clear, accessible, and learner-centred materials.

With strong expertise in graphic design and editorial development, Mr. Atiati demonstrates exceptional attention to detail, aesthetics, and effective communication. A dependable collaborator and committed professional, he played a significant role in shaping the design, structure, and instructional flow of this publication. His contributions ensured that its academic depth was seamlessly matched with clarity, accessibility, and refined presentation, leaving a lasting mark on its overall quality.

Editors & Advisory Scholars — Honour Roll at A Glance

A distinguished fellowship of scholars, thinkers, and institutional visionaries stands behind this publication — each one a mind refined by years of study, leadership, and service. Together, they formed the editorial spine of this Festschrift, illuminating it with wisdom, scrutiny, excellence, and creative force.

For extended biographies, academic profiles, and portraits, readers may refer to the appendix — a gallery of brilliance that reflects the intellectual wealth woven into this book.

Professor Joy Eyisi
Chief Editor & Series Coordinator
A master-builder of ideas — sculpting insight into legacy, and legacy into enduring scholarship.

Professor Charles Chikwendu Okpala
Engineering Consultant & Technical Reviewer
Precision in practice — uniting scientific logic with intellectual craftsmanship.

Professor Geraldine Ifesinachi Nnamdi-Eruchalu
Professor of Stylistics & Advisory Scholar
A radiant voice in English studies — where thought, language, and learning rise in harmony.

Dr. Sheriff Olatunji
Senior Editor
Custodian of clarity — refining language till it flows with light, logic, and meaning.

Dr. Joy Eyisi Jr.
Associate Editor (Youth & Innovation)
Voice of the future — brilliant, creative, and bold in new thought.

Dr. Meek IfeanyiChukwu Eyisi
Clinical Psychology & Behavioural Insight Advisor
Explorer of the human mind — bringing depth, empathy, and critical reasoning to discourse.

Mallam Garba Koko
Director, Planning, Research & Statistics, NCCE
Strategic navigator — guiding reform through data, vision, and educational foresight.

Mr. Lucky Atiati
Instructional Designer & Production Specialist
Art meets structure — turning ideas into visual experience and scholarly form.

Professor David Olugbade Fakeye
Academic Consultant & Style Reviewer
Elegance in intellect — blending scholarship with grace, rhythm, and academic finesse.

Professor Ngozi Chuma-Udeh, CSP
Literary & Cultural Advisor
Historian, culture-bearer, emancipator of minds — where scholarship meets heritage.

Emeritus Professor Godwin Sogolo
Senior Scholarly Advisor (Philosophy & Vision)
A noble thinker — anchoring discourse in reason, wisdom, and intellectual dignity.

Venerable Franklin Mmor
Advisory Member
Moral voice and pastoral heart — where compassion meets scholarly vision.

Kelechi Dibie
Advisory Member
Champion of equity and access — crafting bridges across people, purpose, and policy.

Rev. Fr. Innocent Chukwuma Maduwuba, C.S.Sp.
Advisory Member
Priest-poet — threading spirit, culture, and intellect into harmony.

Dr. Chioma Okonkwo
Advisory Member
Educator of promise — nurturing brilliance, possibility, and lifelong learners.

United in Purpose. Guided by Excellence.
Together, they formed the constellation that steered this work —
each star distinct in brilliance, yet shining as one in honour of
Professor Paulinus Chijioke Okwelle, MNAE, FABEN.

Editorial Introduction

A Festschrift is more than a book — it is a testimony. It is the gathering of minds and memories around the life of one who has lived with purpose, built with conviction, and influenced the future through the quiet power of service. It is scholarship woven into celebration, reflection shaped into record, and gratitude preserved as literature. In this light, the present Festschrift stands as both a scholarly milestone and an offering of honour to **Professor Paulinus Chijioke Okwelle**, Executive Secretary of the National Commission for Colleges of Education (NCCE), whose tenure has redefined what it means to lead with vision in the educational landscape of Nigeria. The theme — *Advancing Education, Empowering Generations* — calls readers to encounter the spirit of Professor Okwelle's life work: a mission to strengthen teacher education, a commitment to raise standards without compromise, and an unshakeable belief that quality teaching births a prosperous nation.

In the hands of a reformer, education becomes light. In the mind of a thinker, it becomes strategy. And in the heart of a servant-leader, it becomes empowerment — one teacher, one classroom, one institution at a time.

This volume represents diverse scholarly voices speaking into that legacy. Its pages examine pedagogy, curriculum innovation, policy advancement, digital transformation, comparative systems, classroom practice, teacher professionalism, inclusivity, vocational competence, and contemporary issues in national education. Here, thinkers question, challenge and reimagine. Researchers expand theory. Analysts propose new frontiers. Poets, storytellers and witnesses bring warmth to memory and life to history. The book mirrors the multifaceted nature of educational work — intellectual, ethical, administrative, human.

Yet beneath the scholarship lies something even more profound: **gratitude.**

A gratitude for a leader who listened, who served, who built.
A gratitude for a teacher whose influence radiates through those who now teach.
A gratitude for a steward whose tenure has strengthened the foundation upon which future generations will stand.

The intellectual architecture of this Festschrift unfolds in four movements:

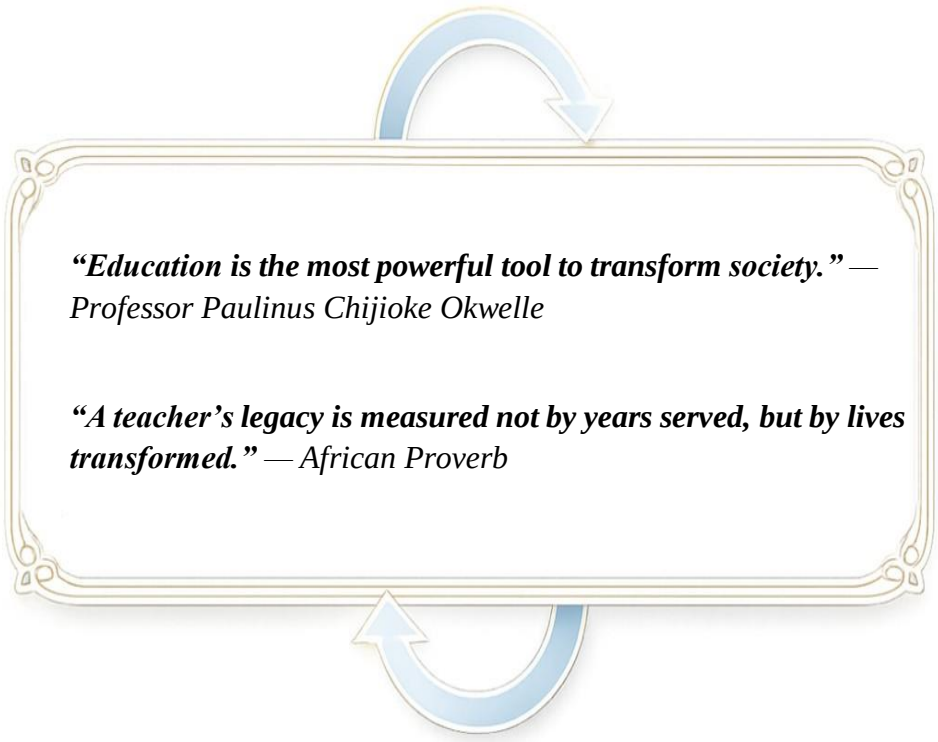
1. **Research Papers** — advancing knowledge through inquiry and evidence.
2. **Conceptual and Policy Papers** — engaging ideas, systems and structural reform.
3. **Reflections, Poems & Creative Writings** — capturing humanity, memory and inspiration.
4. **Encomia: Professor Okwelle in the People's Court of Law** — where testimonies become legacy.

Together, they form a chorus — scholarly, historical, celebratory.

As editors, we present this book not only as a tribute but as a platform. May it provoke deeper research. May it energise teacher trainers, policymakers and education advocates. May it remind us that the future of any nation is authored by those who teach it.

Above all, may it immortalise the leadership, labour, and luminous example of **Professor Paulinus Chijioke Okwelle** — whose footsteps mark a path others may confidently follow.
Welcome to the work.
Welcome to the witness.
Welcome to a legacy in pages.

— The Editorial Board



"Education is the most powerful tool to transform society." *— Professor Paulinus Chijioke Okwelle*

"A teacher's legacy is measured not by years served, but by lives transformed." *— African Proverb*

Biography of the Celebrant

Professor Paulinus Chijioke Okwelle

Scholar • Administrator • Reform Advocate • Champion of Teacher Education

1. Early Life & Origins (1964–1980)

Born on **26 March 1964**, in **Ogbakiri-Ikwerre, Emohua LGA, Rivers State**, Paulinus Chijioke Okwelle grew up within the cultural embrace of the Ikwerre people — a community that values honour, industry, dialogue, and collective responsibility. Raised in Woke's Compound, Rumuoro-Ogbakiri, he experienced first-hand the simplicity of rural life, the dignity of labour, and the power of community values that shaped his worldview and character.

From childhood, he displayed remarkable curiosity and emotional intelligence — attentive to detail, quick to learn, and guided by faith and discipline. The environment provided not only a foundation for learning, but also life lessons that would later inform his leadership ideology: *work hard, build people, serve quietly, and uplift society.*

"The boy who walked village paths would one day lead the national house of teachers."

2. Education & Intellectual Formation (1980–2011)

Professor Okwelle's educational path is marked by discipline, deliberate progress, and an unwavering commitment to academic excellence.

Academic Progression	**Institution**	**Year**
B.Sc. (Hons) *– Industrial/Technical Education (2nd Class Upper)*	Rivers State University	1987
M.Ed. *– Technical Education*	Rivers State University	1995
Ph.D. *– Technical & Vocational Education*	Nnamdi Azikiwe University	2011
TRCN Certified *– Professional Qualification*	Teachers Registration Council of Nigeria	2011

These qualifications reflect a scholar deeply rooted in technical teacher education — a field that requires not only knowledge, but leadership insight, curriculum literacy,

3. Rise in Academia (1988–2021)

Okwelle began his academic career at **Rivers State University** as a young lecturer, driven by passion for technical learning, skills development, and teacher training. He inspired classrooms, supervised budding scholars, and rose steadily through academic ranks to become:

Professor of Industrial/Technical Education
Department of Industrial Technology Education, Rivers State University

His research spans TVET, curriculum innovation, teaching methodology, skills development, student assessment, educational technology, and employability. Over the decades he has:

- Lectured and mentored multiple cohorts of teacher-educators
- Supervised undergraduate, postgraduate & doctoral candidates
- Published over **80 scholarly works** across reputable outlets
- Presented papers at national and global academic forums
- Served on institutional committees & research boards
- Contributed to national policy discussions on teacher training

"He built classrooms, but more importantly — he built teachers."



4. Appointment & Leadership at NCCE (2021–2026)

In **April 2021**, the Federal Government of Nigeria appointed him as the **6th Executive Secretary, National Commission for Colleges of Education (NCCE)**. His mandate: *strengthen teacher education, upgrade standards, modernise programmes, and reposition the NCE system.*

Key Reform Achievements:

Reform Initiative	**Impact**
Accreditation Strengthening	More rigorous programme evaluation & improved quality benchmarks
Curriculum Revision Drive	Aligning NCE programmes to global and industry realities
Digitalisation Initiatives	Promoting ICT adoption and digital teacher training
Development Partnerships	Expanding collaborations for funding, training & infrastructure
Professionalisation Agenda	Enhancing teacher identity, recognition & career growth

His leadership style is consultative, measured and reform-driven — grounded in data, dialogue and developmental strategy rather than rhetoric. The Commission under him has witnessed renewed visibility, strategic partnerships, and a growth in public confidence.



5. Influence, Mentorship & Ideology

Those who have worked with him describe him as:

✓ Calm but decisive

✓ Soft-spoken yet firm

✓ Humble but intellectually alert

✓ Focused on results rather than spotlight

He mentors upcoming scholars generously, values consensus, and encourages innovation within teacher education. His philosophy remains consistent:

Education is the seed. Teachers are the planters. Nations are the harvest.



6. Core Values & Personal Attributes

Value	Manifestation
Integrity	Transparent leadership & accountability
Humility	Respectful, accessible, non-boastful
Service	Work anchored in national development

Value	**Manifestation**
Discipline	Professional dedication, structured thinking
Legacy-mindset	Works with the future always in view

His leadership has been a quiet river — deep, steady, unstoppable.

7. Legacy & Significance

Professor Okwelle's contributions create a legacy defined by:

Strengthened teacher education frameworks
Renewed national confidence in NCE programmes
Modern digital-inclusive pedagogy direction
Improved institutional accreditation culture
An emerging generation of empowered educators

His name stands in the story of Nigerian teacher education — not as one who observed history, but as one who shaped it.

This Festschrift preserves that legacy for future generations.

Acknowledgements

Every great work is the sum of many hands, many minds, and many hearts. This Festschrift — *Advancing Education, Empowering Generations* — is no exception. While it honours the extraordinary life and leadership of **Professor Paulinus Chijioke Okwelle**, it is itself a product of dedication, collaboration, and generosity.

We extend our profound gratitude to the **contributors** — scholars, educators, policy experts, creative writers, and practitioners — who responded to our call with intellectual rigour, reflective insight, and heartfelt tributes. Your research, essays, poems, dialogues, and reflections have enriched this volume beyond measure.

To the **reviewers and peer evaluators**, whose meticulous scrutiny, constructive feedback, and commitment to scholarly excellence ensured that every paper met the highest standards, we offer our deepest appreciation. Your expertise has sharpened the intellect and polished the brilliance of every contribution.

We thank the **Editorial Board** for their tireless effort in conceptualising, coordinating, editing, and shaping this work into a cohesive, dignified, and enduring tribute. Your wisdom, discipline, and creative foresight have transformed ideas into an immortal record.

Our gratitude extends to **supporting institutions and partner bodies**, including the National Commission for Colleges of Education (NCCE), development partners, academic networks, and colleagues across the education sector. Your cooperation, encouragement, and provision of resources have made this publication possible.

Finally, to **Professor Paulinus Chijioke Okwelle** himself — for the inspiration, guidance, and example that formed the foundation of this work — we dedicate not only these pages but our respect, admiration, and enduring commitment to continuing the legacy you have built.

It is often said, *"It takes a village to raise a scholar, and a nation to honour a leader."* This Festschrift is a testament to that truth: a collective gesture of appreciation, recognition, and celebration.

Joy Eyisi
For and on behalf of the Editors

A Note of Gratitude from the Executive Secretary

It is with deep humility, heartfelt appreciation, and a profound sense of honour that I receive this Festschrift — *Advancing Education, Empowering Generations* — dedicated to my journey and service in the field of teacher education. While my name graces these pages, the reality is that this work reflects the collective labour, collaboration, and shared vision of countless colleagues, mentors, students, and friends who have walked this path with me.

To the **contributors**, I am immeasurably grateful. Your scholarship, reflections, essays, and creative tributes have transformed what might have been a mere record of service into a living testimony of ideas, memory, and influence. Each contribution resonates with insight, passion, and the noble purpose of advancing education in Nigeria and beyond.

To the **reviewers and editorial team**, I extend sincere thanks for your meticulous attention to detail, unbeatable commitment to excellence, and your role in shaping this volume into a cohesive and dignified work. Your dedication ensures that the intellectual and celebratory integrity of this Festschrift is preserved for posterity.

I wish to register special and profound appreciation to **Professor Joy Eyisi**, our Editor-in-Chief, whose vision, diligence, and steadfast commitment brought this Festschrift to life. Her leadership, creativity, and careful orchestration of editorial processes have made it possible for this collective tribute to reach its full potential. This work stands as much a testament to her stewardship as it does to the contributions of every scholar represented here.

I am equally grateful to the **institutions, partners, and colleagues** whose cooperation and support have been foundational to my tenure at the National Commission for Colleges of Education. Your trust, encouragement, and shared commitment to teacher education have made possible reforms, innovations, and progress that no single individual could have achieved alone.

Above all, I am deeply indebted to the **teachers and students of Nigeria**, past and present. You are the reason for this journey, the inspiration for reforms, and the ultimate beneficiaries of the work chronicled here. It has been my privilege to serve, to listen, to learn, and to work in pursuit of your professional growth and success.

This Festschrift is more than a tribute; it is a celebration of collective endeavour, a testament to the enduring power of education, and a call to continue the work that shapes generations. I pray that the pages of this book inspire current and future educators, ignite the curiosity of scholars, and affirm the enduring value of leadership that serves, guides, and uplifts.

In gratitude, humility, and hope,
Professor Paulinus Chijioke Okwelle
Executive Secretary, NCCE

Advancing Education, Empowering Generations

Celebrating Professor Paulinus Chijioke Okwelle, MNAE, FABEN
Executive Secretary, National Commission for Colleges of Education (NCCE)

In the dynamic world of education, leadership that inspires change is both rare and invaluable. Professor Paulinus Chijioke Okwelle exemplifies such leadership—a steward whose vision, dedication, and strategic foresight have shaped generations of educators and learners across Nigeria.

This volume is more than a collection of scholarly contributions; it is a celebration of influence and impact. It captures not only the reforms and innovations Professor Okwelle has championed, but also the ethos that guided them—the relentless pursuit of excellence, the courage to innovate, and the unwavering commitment to empower others.

Here, scholarship becomes testimony. Writing becomes advocacy. Each chapter embodies a dual purpose: documenting transformative educational practices and inspiring future generations to carry forward the mantle of progress.

We approached this Festschrift with the same principles that define Professor Okwelle's exemplary leadership:

Champion Evidence-Based Reform
Every contribution reflects rigorous inquiry, grounded in research, policy insight, and practice-tested strategies. The result is a holistic map of educational advancement, from classroom innovations to systemic reforms.

Cultivate Lifelong Learning
This collection is a product of communities dedicated to continuous growth—learning, unlearning, and reimagining education. It mirrors Professor Okwelle's own journey: one that favours curiosity, reflection, and the transformative power of knowledge.

Prioritise Integrity and Excellence
Transformational education cannot be hurried. Each idea was nurtured, each argument refined, ensuring that what is recorded here can guide educators, policymakers, and scholars for decades to come.

Empower Through Knowledge

Education is empowerment. By documenting strategies, innovations, and insights, this Festschrift offers a roadmap for others to elevate learning environments, inspire educators, and shape the next generation of leaders.

Conclusion: Write to Transform, Not Just Inform

True leadership leaves a mark not in titles, but in lives touched and systems improved. This book stands as both archive and compass—honouring the legacy of Professor Paulinus Chijioke Okwelle, celebrating his contributions, and charting pathways for the future of education in Nigeria and beyond.

Selected Bibliography of Professor Paulinus Chijioke Okwelle

Advancing Education, Empowering Generations: A Legacy in Scholarship, Policy, and Service

"Education is the most powerful instrument to transform a nation; those who guide it with vision shape the destiny of generations."

This curated bibliography presents a distinguished selection of scholarly works, policy contributions, and institutional initiatives by Professor Paulinus Chijioke Okwelle, MNAE, FABEN — an eminent educationist, transformative administrator, and beacon of leadership in teacher education in Nigeria. His contributions span academic research, curriculum innovation, institutional governance, and digital-era teacher empowerment, providing a foundational resource for educators, policymakers, institutional leaders, and all committed to advancing the standards of teaching and learning across Nigeria and beyond.

A. Academic Scholarship and Research Articles

Professor Okwelle has authored and co-authored over one hundred research articles, journals, and book chapters, contributing empirical and conceptual frameworks for quality assurance, curriculum relevance, and pedagogical renewal in teacher education. His scholarly work bridges technical, industrial, and vocational education with contemporary pedagogical theory, enhancing the professional preparation of teachers across Nigeria.

His supervision of numerous Master's and Ph.D. theses, along with service as external examiner across multiple institutions, underscores his commitment to mentoring the next generation of teacher-educators and educational researchers.

B. Books, Monographs, and Institutional Reports

With roots in Technical and Industrial Technology Education, Professor Okwelle has authored and contributed to numerous books and monographs that address teacher training, educational policy, and institutional transformation. His academic grounding and professional expertise enable him to integrate technical disciplines with pedagogy and administration, offering holistic insights into teacher education.

While serving as Executive Secretary of the National Commission for Colleges of Education (NCCE), he has overseen the development of strategic curriculum frameworks, quality assurance guidelines, and governance protocols — all designed to elevate teacher education standards nationwide.

C. Institutional Leadership, Policy Reforms, and National Impact

Since his appointment as the sixth substantive Executive Secretary of NCCE in April 2021, Professor Okwelle has led a sweeping transformation of teacher education in Nigeria, embedding innovation, relevance, and professionalism across the sector.

He has spearheaded a nationwide curriculum overhaul for Colleges of Education, aligning programs with global standards while addressing national and local educational realities.

He has championed the integration of ICT and digital tools in teacher education, preparing graduates for 21st-century classrooms and ensuring the profession remains dynamic and globally competitive.

Beyond curriculum reforms, he has advocated for effective administration, transparent governance, and data-driven decision-making, reinforcing institutional integrity and continuity.

His leadership extends to literacy and foundational education initiatives, collaborating with partners to promote early-grade reading in indigenous languages, reflecting a commitment to the societal mission of teacher education.

D. Editorial, Mentorship, and Capacity-Building Contributions

Professor Okwelle has mentored countless educators, teacher-educators, and policymakers through supervision, advisory roles, and professional service. His vision extends beyond qualifications to encompass empowerment, skill development, and real-world readiness. His editorial and advisory contributions to teacher-education publications and institutional frameworks continue to shape discourse on quality, relevance, and accountability in Nigeria's Colleges of Education.

Why This Bibliography Matters

Professor Okwelle's body of work — academic, administrative, policy, and reform — transcends individual achievement. It embodies a transformative vision for teacher education that seeks to:

- Elevate teaching standards through rigorous research and continuous curriculum renewal.
- Empower teacher-trainees with ICT and entrepreneurial skills, making the profession relevant and sustainable.
- Restore dignity, professionalism, and innovation to teaching as a career, ensuring educators are well-equipped, supported, and inspired.
- Anchor teacher education in national development and societal progress, emphasising literacy, inclusion, and community-centred learning.
- Provide a living legacy — a foundation for future scholarship, policy innovation, and educational leadership in Nigeria and beyond.

In presenting this Selected Bibliography, we celebrate not only Professor Okwelle's work but also the vision, integrity, and dedication that animate it — a spirit committed to excellence, transformation, service, and the empowerment of generations through education.

May the scholarship and service of Professor Paulinus Chijioke Okwelle continue to inspire, guide, and shape future educators, scholars, and leaders for generations to come.

Profile of Institutional Reforms & Policy Contributions (2021–2025)

Extended Profile & Impact Log — Professor Paulinus C. Okwelle (2020 – 2025+)

Year / Period	Category / Initiative / Document	Description / Significance
2024 (Aug 16)	**Digital-Skills Partnership — MoU between NCCE & GetBundi Education Technology**	Under the banner "Empowering Tomorrow's Teachers," NCCE, under Prof. Okwelle's leadership, signed a Memorandum of Understanding with GetBundi to train 2,900 students from 29 federal Colleges of Education in digital competencies (Creative Media, Excel, Digital Marketing, etc.). This pilot initiative equips teacher-trainees with 21st-century skills, preparing them to thrive in modern classrooms and digital learning environments. (ThisDayLive)
2025 (Nov)	**Nationwide Curriculum Overhaul & Technology Upgrade**	NCCE commenced deployment of upgraded technology solutions and initiated a comprehensive curriculum review across all Colleges of Education. This quinquennial review ensures teacher-education programmes align with global standards and respond to contemporary national and international educational needs. (The Abuja Inquirer)
2025 (Dec)	**Dual-Mandate Implementation: NCE + Degree Programmes**	NCCE inaugurated a committee, under Prof. Okwelle's direction, to operationalise policy allowing accredited Colleges of Education to run NCE and degree (B.Ed or equivalent) programmes concurrently. Anchored in the

		Federal Colleges of Education (Establishment) Act No. 43 of 2023, this reform represents a historic expansion of teacher-education pathways in Nigeria. (NCCE)
2025 (June)	**Keynote Address on Institutional Reform & Conflict-Sensitive Leadership**	At the Human Capital Development Conference, Prof. Okwelle advocated for robust administrative structures, data-driven governance, transparency, and conflict-sensitive leadership. His address highlighted the critical interplay between institutional health and academic quality in sustainable educational reform. (NCCE)
2025 (July)	**Humanitarian & Livelihood Intervention Advocacy**	Prof. Okwelle engaged with the Presidency's office on Humanitarian Affairs to secure support for welfare and livelihood programmes for staff and students across Colleges of Education, demonstrating a commitment to the human dimension of educational transformation. (NCCE)
2022 – Present	**Editorial Leadership — Editor-in-Chief, *The Nigerian Teacher Today* (TNTT)**	Under Prof. Okwelle's stewardship, TNTT continues to serve as a platform for scholarly discourse, policy analyses, research findings, and innovations in teacher education. This leadership ensures that NCCE remains at the forefront of pedagogical standards, research dissemination, and professional development. (NCCE)
2021 (upon appointment)	**Structural Reform & Commission**	Since assuming office in April 2021, Prof. Okwelle has guided NCCE through a period of

	Repositioning — Executive Secretary	repositioning, aligning teacher-education oversight with renewed standards, enhanced governance, and strategic reforms aimed at systemic quality assurance. (NCCE Annual Report, 2021)
2023–2024 (Ongoing)	**Strategic Collaboration Advocacy — TETFund & Early-Grade Reading Projects**	Prof. Okwelle advocated for stronger collaboration between NCCE and TETFund to support Centres of Excellence, micro-teaching laboratories, and early-grade reading interventions, including indigenous-language literacy materials — reflecting his commitment to holistic teacher education. (TETFund)
2024 onward	**Quality Assurance & Sector Clean-up**	NCCE closed over 160 unlicensed Colleges and study centres, safeguarding the integrity of the NCE credential and ensuring quality standards for teacher-education institutions nationwide. (TheCable)

Remarks & Observations

- Prof. Okwelle demonstrates a **holistic vision of educational reform** — encompassing curriculum, technology, governance, welfare, and systemic quality assurance.
- The **Dual-Mandate Policy** exemplifies his commitment to expanding access, diversifying pathways, and elevating the profile of teacher training in Nigeria.
- Leadership of TNTT journal bridges **scholarship and practice**, ensuring reforms are informed by research and best practices.
- Digital-skills initiatives and ICT integration showcase his **forward-looking responsiveness** to global educational trends.
- Emphasis on welfare, capacity building, and ethical leadership reflects a **people-centred, sustainable, and values-driven approach** to transformation — beyond mere structural reforms.

Milestones & Achievements (2021–2025)

Advancing Education. Empowering Generations. Transforming Teacher Education in Nigeria

2021 (April) — Assumed Office as Executive Secretary, NCCE

- Began transformative leadership of the National Commission for Colleges of Education.
- Initiated structural reforms, strengthened governance, and repositioned the Commission for **systemic quality assurance** in teacher education.

2022 – Present — Editorial Leadership: Editor-in-Chief, *The Nigerian Teacher Today*

- Elevated the journal as a platform for **policy discourse, research insights, and pedagogical innovation**.
- Fostered a culture of **evidence-based decision-making** and scholarly engagement across teacher-education institutions.

2023–2024 — Strategic Collaboration & Early-Grade Literacy Initiatives

- Advocated partnerships with **TETFund** to establish Centres of Excellence and micro-teaching laboratories.
- Championed **early-grade reading interventions**, including indigenous-language literacy, emphasizing holistic teacher preparation.

2024 (August 16) — Digital-Skills Empowerment Partnership with GetBundi Education Technology

- Launched a **pilot training programme** for 2,900 teacher-trainees across 29 federal Colleges of Education.

- Equipped future educators with **21st-century digital skills**: Creative Media, Excel, Digital Marketing, and more.

2024 Onward — Quality Assurance & Sector Clean-up

- Closed over **160 unlicensed Colleges and study centres**, safeguarding the NCE credential.
- Reinforced **institutional integrity, standards, and professionalism** in teacher education.

2025 (June) — Keynote Address on Institutional Reform & Conflict-Sensitive Leadership

- Advocated **data-driven governance, transparency, and conflict-sensitive leadership** as pillars of sustainable educational reform.

2025 (July) — Humanitarian & Livelihood Interventions for Colleges of Education Communities

- Engaged with the **Presidency's office on Humanitarian Affairs** to support staff and students' welfare and livelihood.
- Demonstrated a **people-centred, socially responsive dimension** of educational leadership.

2025 (November) — Nationwide Curriculum Overhaul & Technology Upgrade

- Deployed **advanced technology solutions** across Colleges of Education.
- Launched **quinquennial curriculum review** to ensure alignment with **global standards** and contemporary relevance.

2025 (December) — Dual-Mandate Policy Implementation: NCE + Degree Programmes

- Operationalised policy allowing Colleges of Education to run **NCE and B.Ed programmes concurrently**.

- Marked a **historic expansion** in teacher education pathways under visionary leadership.

Impact at a Glance

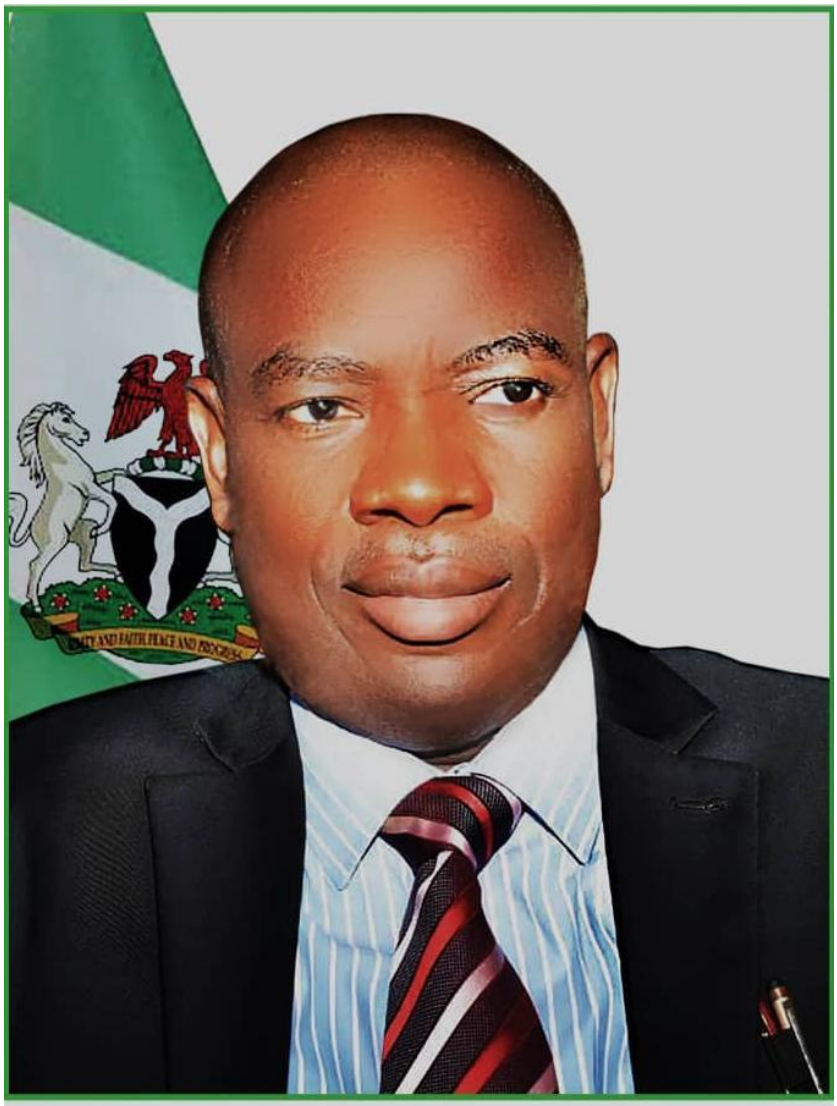
- **Holistic Reform:** Curriculum, governance, technology, welfare, and systemic quality assurance.
- **Access & Relevance:** Expanded pathways, digital skills integration, and dual-degree opportunities.
- **Scholarship Meets Practice:** Research-driven decisions, policy discourse, and journal leadership.
- **Values-Driven Leadership:** Ethical, people-centred, and sustainable transformation for teacher education.



Home of vision and transformation — where teacher education is guided by excellence, scholarship, and a commitment to empowering generations under the leadership of Professor Paulinus Chijioke Okwelle.

ADVANCING EDUCATION, EMPOWERING GENERATION, A FESTSCHRIFT

In Honour Of



PROF. PAULINUS CHIJIOKE OKWELLE

EXECUTIVE SECRETARY

NATIONAL COMMISSION FOR COLLEGES OF EDUCATION [NCCE]

SECTION ONE

EXECUTIVE INTERVIEW SERIES

In Conversation with a Reformer: Leadership, Legacy & the Future of Education

Professor Paulinus Chijioke Okwelle
Executive Secretary, National Commission for Colleges of Education (NCCE)

An Executive Interview with Professor Paulinus Chijioke Okwelle

Executive Secretary, National Commission for Colleges of Education (NCCE)

Good morning, Prof, please permit us to have a chat with you.

A. Vision, Leadership & Transformation

1. Editor-in-Chief: What core principles have guided your leadership journey in NCCE?

First and foremost, I give all glory to God Almighty, whose grace found me worthy of this position, sustained me, and ordered my steps in this season of leadership. My leadership approach has been anchored on integrity, accountability, service, and reform-mindedness. I believe public office is a trust, not a privilege. At the NCCE, I am driven by the conviction that systems must serve people, and that institutions thrive only when rules are clear, standards are enforced, and everyone understands that excellence is non-negotiable

2. Editor-in-Chief: How would you describe your philosophy of leadership in public service?

I practise purpose-driven leadership. Public service leadership must combine vision with discipline and authority with empathy. I believe in building institutions that outlive individuals, and in making decisions that favour national interest over convenience or popularity.

3. Editor-in-Chief: What defining moments shaped your transition from academic to administrator?

My years as an academic—teaching, researching, mentoring, community services, and serving as external examiner—exposed me to the disconnect between policy and classroom realities. That realisation, coupled with opportunities to serve at higher administrative levels, convinced me that impact at scale requires engagement with policy, governance, and institutional reform.

4. Editor-in-Chief: What do you consider the most critical leadership competency for emerging administrators?

Beyond technical competence,Strategic thinking anchored in emotional intelligence is very critical for emerging administrators. An effective administrator must see the big picture while understanding people. You cannot lead institutions without leading hearts, managing conflict, and communicating purpose clearly. Ultimately,

sustainable leadership is built on character—because institutions rise or fall on the values of those who lead them

5. Editor-in-Chief:What does leadership mean to you at its most human level?

Leadership, at its most human level, is service and responsibility for people's hopes. It is knowing that your decisions affect livelihoods, careers, students, and futures—and choosing to act with fairness, empathy, and courage. Fundamentally, leadership is not about position or authority; it is about impact, trust, and the positive difference one makes in the lives of others.

6. Editor-in-Chief: How do you lead with both firmness and compassion?

Firmness comes from clear standards and consistency; compassion comes from listening and understanding context. I insist on rules, but I also insist on dialogue. Discipline without empathy breeds fear; empathy without discipline breeds disorder. Effective leadership balances both.

7. Editor-in-Chief: What early experiences prepared you for national leadership?

My upbringing emphasised faith in God, discipline, humility and respect for learning, and service. My academic journey—from primary school through doctoral training—taught me perseverance and intellectual rigour. These experiences shaped my sense of duty and prepared me for national responsibility.

8. Editor-in-Chief: In a sentence, what is your leadership creed?

"Lead with integrity, serve with courage, reform with purpose, and leave every institution better than I met it."

9. Editor-in-Chief: How do you sustain vision in moments of institutional resistance?

By returning to evidence, engaging stakeholders meaningfully, and remaining patient. Resistance is often fear in disguise. When people understand why change is necessary and how it benefits the system, resistance gradually gives way to cooperation and ownership.

10. Editor-in-Chief: What lesson did leadership teach you that books never could?

Leadership taught me that people matter more than policies. Policies succeed only when people believe in them, trust the process, and feel genuinely respected and valued within the system.

B. Reforms, Achievements & Impact

11. Editor-in-Chief: What reforms stand as milestones under your administration?

One major milestone has been the repositioning of quality assurance in Colleges of Education. We strengthened accreditation processes, enforced compliance with minimum standards, and decisively addressed the proliferation of illegal programmes. We also refocused NCCE on its core mandate—teacher quality—moving beyond routine administration to purposeful regulation and reform.

12. Editor-in-Chief: Which policy advancements remain closest to your heart — and why?

The review and realignment of teacher education curricula remains closest to my heart. Teachers shape every other profession. When teacher preparation is weak, the entire education system suffers. Ensuring relevance, competence, and ethical grounding in teacher education is foundational to sustainable national development.

13. Editor-in-Chief: How has NCCE strengthened quality assurance in Colleges of Education?

We introduced more rigorous, transparent, and technology-supported accreditation processes, improved monitoring mechanisms, and insisted on compliance rather than negotiation. Quality assurance is no longer episodic; it is becoming a culture.

14. Editor-in-Chief: What challenges tested you most deeply, and how were they overcome?

Low enrolment, funding constraints, and resistance to reform tested me deeply. These were addressed through stakeholder engagement, strategic policy advocacy, collaboration with agencies like JAMB, and honest conversations with institutions about relevance, performance and public trust.

15. Editor-in-Chief: Which reform required the greatest courage?

Confronting substandard institutions and programmes required courage. Reform is rarely comfortable when it challenges entrenched interests, but leadership demands the courage to protect standards, even when it attracts criticism.

16. Editor-in-Chief: What uncompleted reform do you hope your successor will pursue?

I hope my successor will fully consolidate digital transformation across Colleges of Education, ensuring that technology-driven teaching and learning becomes universal rather than selective.

17. Editor-in-Chief: Which of your reforms do you believe will outlive your tenure?

The strengthened quality assurance framework, renewed emphasis on teacher professionalism, alongside the seeds we have planted for digital integration, will outlive my tenure. Once standards are internalised, institutions begin to self-correct. These are not just policies; they are foundational shifts in how institutions view themselves and their mission, creating a systemic immune response that protects standards long after any single leader has moved on.

18. Editor-in-Chief: How do you measure impact beyond statistics?

While statistics track enrolment and completion rates, true impact is measured in human currency. In this context, impact is seen in confidence restored, in institutions taking ownership of quality, in lecturers upgrading their skills, and in graduates better prepared for classrooms. Numbers matter, but transformation is ultimately human.

19. Editor-in-Chief: Which stakeholder groups influenced your policy direction most?

Provosts, lecturers, students, and regulatory partners influenced our policies greatly. Listening to those closest to implementation ensures policies are practical, inclusive, and sustainable.

20. Editor-in-Chief: What success story gives you quiet satisfaction when you reflect?

Seeing Colleges of Education regain relevance and confidence, despite national challenges, gives me quiet satisfaction. When institutions begin to believe again in their mission, reform has truly begun. However, the most tangible milestone—and one that will define this era—is the implementation of the Federal Government's **Dual Mandate policy**. Empowering Colleges of Education to award both the Nigeria Certificate in Education (NCE) and Bachelor's Degrees in Education is a transformative step. It directly addresses the resource wastage caused by declining NCE enrolment while simultaneously expanding access, improving quality, and strengthening professional competence. More importantly, it enhances career progression pathways for teachers, elevating the status of the profession itself. Seeing this policy move from concept to reality this year is not just a reform; it is the creation of a gateway for a new generation of educators, and that gives me profound, lasting satisfaction.

C. Digital Futures & Educational Transformation

21. Editor-in-Chief: How will digital technology redefine teacher training in the next decade?

Digital technology will fundamentally expand how we train teachers, not just what we teach them. Beyond traditional classroom methods, tomorrow's teacher must be fluent in blended-learning platforms, interactive digital tools, and data-informed instruction. Our goal is to produce teachers who are not merely consumers of technology, but designers of learning experiences that harness digital tools to improve student outcomes. This is non-negotiable in a rapidly evolving educational ecosystem. The initiatives we've launched — such as equipping lecturers and students with digital literacy skills — are deliberate, foundational steps in that direction.

22. Editor-in-Chief: What steps must institutions take to bridge digital inequality?

Colleges of Education must prioritise access, capacity building and infrastructure. It starts with equipping campuses with reliable connectivity, digital platforms and devices, but it goes further — ensuring lecturers are trained to use these technologies effectively, and that students engage meaningfully with them. Bridging digital inequality is not only about tools, but about competence and confidence. Our recent collaborations with tech partners and ICT training for lecturers illustrate one way forward: provide tools and the skills to use them confidently.

23. Editor-in-Chief: How can Nigeria remain globally relevant in pedagogy and research?

Global relevance demands interdisciplinary integration, rigorous research culture, and pedagogies that marry theory with practical impact. By embracing 21st-century competencies — digital literacy, creative thinking, and entrepreneurial mindsets — into teacher education, we prepare teachers who not only instruct well, but innovate well. Nigeria's capacity to lead in education hinges on our ability to produce research that shapes policy and to embed global best practices into teacher preparation programmes, while remaining responsive to local realities.

24. Editor-in-Chief: What role do AI and automation hold in future classrooms?

AI and automation are catalysts for improved teaching and learning — not replacements — for human teaching. When deployed ethically and intelligently, they can personalise learning, provide real-time feedback, and automate administrative tasks so teachers can focus on higher-order instruction and mentorship. Our focus

must be on augmenting human capabilities, ensuring that technologies enhance professionalism, not erode it.

25. Editor-in-Chief: Are we preparing teachers for technologies that do not yet exist?

Yes — and that is precisely the point. We must cultivate adaptability and lifelong learning in teacher trainees. That means teaching them how to learn with and through technology, not simply how to use specific tools. Curricula must become living instruments that anticipate change, not static relics of yesterday's needs.

26. Editor-in-Chief: How do we protect academic integrity in a digital age?

Academic integrity in the digital age is anchored in ethical formation, clear policies, and robust digital literacy. Teachers must model integrity, and institutions must deploy systems that ensure authenticity in student work. As educators, we must teach how to leverage information responsibly and to value original thought even as tools make duplication effortless.

27. Editor-in-Chief: What digital initiative do you consider your strongest contribution?

One of our strongest contributions has been strategic partnerships to embed digital competencies into teacher preparation, such as the collaboration with Huawei Technologies Company (Nigeria) Limited and GetBundi Education Technology aimed at equipping future teachers with digital skills that go beyond traditional pedagogy. This initiative seeks to embed digital fluency into the core of teacher training, making the NCE credential even more valuable and relevant in the 21st century education ecosystem.

28. Editor-in-Chief: How can Colleges of Education move from analogue to intelligent systems?

Colleges must adopt data systems, e-learning platforms, and real-time feedback mechanisms that inform instruction and policy. By investing in digital infrastructure, training lecturers on e-platforms, and aligning curricula with emerging digital demands, colleges can transition from analogue routines to intelligent, responsive learning ecosystems.

29. Editor-in-Chief: What scares you most — or excites you most — about education's digital future?

What excites me most is the possibility of equitable access and expanded opportunity to quality learning, personalise instruction and the unlocking of creativity at scale. A digitally fluent teacher can unlock learning for students regardless of geography or background. What challenges me — and what should challenge all of us — is ensuring that no learner or educator is left behind in the digital transformation. The

future will favour systems that invest not only in technology, but in people—building the skills, values, and governance needed to ensure that digital transformation serves equity, quality, and human development.

30. Editor-in-Chief: If you could push one nationwide ed-tech policy tomorrow, what would it be?

I would champion a *National Digital Literacy*-first policy for teacher education, mandating that every teacher-training programme incorporates progressive digital competencies as core, examinable components. Teachers must lead digital transformation — not merely adapt to it. This policy would institutionalise digital fluency as a professional standard and ensure that every new teacher enters the classroom equipped to teach, innovate, and lead in a technology-driven learning environment.

D. Research, Pedagogy & Teacher Professionalism

31. Editor-in-Chief: What research gaps require urgent national attention?

Nigeria urgently needs research that connects teacher education to classroom outcomes. Many studies remain theoretical. We need actionable research on pedagogical effectiveness, curriculum relevance, teacher competency, and digital integration — studies that can directly inform policy and practice in our Colleges of Education and other teacher training institutions.

32. Editor-in-Chief: How can we inspire researchers to influence policy more directly?

Researchers must be proactive in engaging policy circles. I encourage academics to present findings in policy-friendly formats, to participate in commissions, and to collaborate with government agencies. Research should not live solely in journals; it must speak to national development priorities and reform agendas.

33. Editor-in-Chief: What reforms will elevate teaching to a profession of prestige?

We must combine rigorous professional standards with continuous professional development. Teachers should be properly recognised, remunerated, and held to high ethical and pedagogical standards. Elevating teaching also means integrating leadership, research skills, and technology proficiency into their training.

34. Editor-in-Chief: How can we strengthen research culture among trainees and lecturers?

By embedding research more deeply into the core curriculum of teacher education, providing mentorship, access to funding, and strong institutional support. Partnerships with industries and communities should be encouraged so research solves real-world problems, not just academic curiosities.

35. Editor-in-Chief: What models of continuous professional development would you recommend?

A blended approach that combines online modules, in-person workshops, peer learning, and reflective practice. Professional development must be ongoing, cumulative, and evaluated for effectiveness. Technology can scale this, ensuring educators nationwide benefit from high-quality training.

36. Editor-in-Chief: How can classroom practice become more inquiry-driven and reflective?

By encouraging teachers to question, experiment, and reflect rather than just transmit information. Lesson planning, assessment, and classroom observation should emphasise critical thinking, problem-solving, and reflective practice. This approach turns classrooms into living laboratories of learning.

37. Editor-in-Chief: What is the biggest misconception about teacher education?

That teaching is easy or secondary to other professions. Teaching is foundational to all human capital development. Without well-trained, motivated, and ethical teachers, every other profession is weekened at its roots.

38. Editor-in-Chief: How do we attract brilliant minds into teaching — not by compulsion but by choice?

By showing teaching as a profession of innovation, research, leadership, and influence. Teachers shape the nation. Policies must reward excellence, provide career growth, and make teaching aspirational rather than obligatory.

39. Editor-in-Chief: Which single pedagogical shift will transform classrooms the most?

The shift from teacher-centered instruction to learner-centered, inquiry-based learning. When learners are active participants, classrooms become spaces of curiosity, creativity, and deep lasting learning.

40. Editor-in-Chief: What would you tell a struggling teacher who loves the classroom but feels unseen?

I would say: "Your work is never unnoticed by those who matter most — your students. Your impact is real, even when it is quiet. You are shaping lives, futures, and possibilities—often in ways you may never fully see. Stay committed, keep learning, adapt with courage, and remember that the seeds you plant today will speak for you tomorrow. Also, note that greatness in teaching often blooms quietly before it is celebrated"

E. Policy Governance, Standards & Nation-Building

41. Editor-in-Chief: What must be reformed urgently within Nigeria's education architecture?

Nigeria must urgently streamline teacher education, standardise curricula, and enforce quality assurance across all Colleges of Education,and other teacher training institutions pipeline. Fragmentation, duplication, and inconsistent standards weaken our human capital. What we need are strong, enforceable policy frameworks that build coherence and credibility across the system.

42. Editor-in-Chief: How do you balance innovation with regulatory responsibility?

Innovation and regulation must complement, not conflict. I encourage experimentation within clear boundaries, and any innovation must respect ethical, pedagogical, and legal standards. The goal is a regulatory environment that safeguards quality and standards while creating space for responsible creativity and reform.

43. Editor-in-Chief: What does a strong national education policy look like to you?

It is coherent, evidence-based, future-oriented, and inclusive. It must clearly articulate teacher training standards, integrate digital learning, and provide mechanisms for accountability and continuous review. Policies should be living instruments, adaptable to emerging societal and technological needs.

44. Editor-in-Chief: How can policy become more evidence-based and less politically influenced?

Through institutionalised research, stakeholder consultation, and transparent data-driven processes. When policy formulation relies on evidence from the field rather than political expediency, outcomes improve, reforms are sustained, and public trust grows.

45. Editor-in-Chief: What structural barriers still constrain teacher education?

Persistent issues include underfunding, inadequate digital infrastructure, capacity gaps among personnel, and inconsistent enforcement of standards. Additionally, fragmentation between agencies and lack of continuous professional development limit the profession's effectiveness.

46. Editor-in-Chief: How should future executives build on the work you have begun?

They should prioritise quality over quantity, continue digital transformation, strengthen teacher professionalism, and maintain integrity in leadership. Sustaining reforms requires commitment to evidence-led decision-making, collaboration, and courage to challenge entrenched interests.

47. Editor-in-Chief: What would you redesign if the system allowed a clean slate?

I would create a fully integrated national teacher education system where curriculum, technology, professional development, and research are seamlessly aligned, and supported by robust yet enabling regulatory oversight.

48. Editor-in-Chief: How do we decentralise innovation while preserving national standards?

By setting clear national benchmarks and allowing institutions to innovate within those parameters. Strong accreditation, mentoring frameworks, and periodic audits ensure standards, while institutional autonomy encourages creative approaches to teaching and learning.

49. Editor-in-Chief: What role should NCCE play in Africa-wide teacher education policy?

NCCE should lead by example, sharing best practices, quality-assurance frameworks, and digital transformation models with other African nations. Strategic collaboration with regional bodies can position Nigeria as a centre of excellence in teacher education across Africa.

50. Editor-in-Chief: If afforded a second tenure, what new agenda would you drive?

The current Act establishing NCCE provides for single tenure for the Chief Executive.

F. People, Mentorship & Leadership Culture

51. Editor-in-Chief: How do you build loyalty and trust within teams?

Loyalty and trust are built through consistency, fairness, and transparency. I listen genuinely, communicate expectations clearly, and recognise effort. People respect leaders who keep their word, treat staff with dignity, and reward merit without favoritism.

52. Editor-in-Chief: What qualities make an ideal education leader?

An ideal education leader is visionary, ethical, resilient, courageous and empathetic. They combine strategic foresight with human understanding, inspire others through example, and maintain integrity even under pressure. Also, such a leader builds partnerships, and remains steadfastly committed to equity, quality, and national development.

53. Editor-in-Chief: How do you handle dissent without silencing ideas?

I welcome constructive dissent. Every perspective has potential value. I encourage open dialogue, mediate differences respectfully, and ensure decisions are informed by diverse insights, not just hierarchical authority.

54. Editor-in-Chief: Who were your greatest mentors, and what values did they instill?

I owe a profound debt to my late elder brother, a distinguished educator, as well as to my academic mentors and senior administrators, who exemplified integrity, discipline, and intellectual rigour. They taught me that excellence is a habit, not an act, and that leadership is measured by the progress of those you serve, not by personal accolades.

55. Editor-in-Chief: How do you mentor the next generation of institutional leaders?

I mentor by providing guidance, opportunities, and constructive feedback. I encourage young leaders to learn by doing, to embrace challenges, and to prioritise ethical decision-making. Mentorship is about preparing others to surpass you, not replicate you.

56. Editor-in-Chief: What culture do you believe an organisation must never compromise?

An organisation must never compromise integrity and accountability. These are the bedrock of trust, credibility, and sustainable impact.

57. Editor-in-Chief: How do you restore morale when a team is discouraged?

Through acknowledgment, encouragement, and reorientation. I remind teams of their achievements, clarify purpose, provide support for skill development, and celebrate incremental wins to restore confidence.

58. Editor-in-Chief: What do you look for when selecting people to work closely with you?

I look for competence, reliability, ethical fortitude, and a collaborative spirit. Skills are important, but character and commitment to collective goals are non-negotiable.

59. Editor-in-Chief: How should leaders handle praise — gently or boldly?

Leaders should accept praise with humility and share it generously with their teams. Leadership is never a solo endeavour; recognition should lift the organisation, not inflate the individual ego.

60. Editor-in-Chief: What leadership advice would you give a first-time administrator?

"Lead with integrity, listen more than you speak, prioritise people, and remember that your legacy is measured by the positive changes you leave behind, not the titles you hold."

G. Personal Reflections, Discipline & Humanity

61. Editor-in-Chief: What anchors your daily discipline and work ethic?

My daily discipline and work ethic are grounded in a deep sense of duty, purpose, and faith in God. I begin each day mindful that my work shapes the lives of teachers and learners and, by extension, the nation's future. That awareness sharpens my focus, strengthens my consistency, and guides me with clear priorities, respect for time, and the conviction that leadership requires accountability and personal example.

62. Editor-in-Chief: How do you remain calm under pressure or scrutiny?

I remain steady under pressure by relying on preparation, evidence, and principle rather than emotion. Prayer, quiet reflection, and consultation with trusted colleagues help me maintain perspective before responding publicly. Pressure is inevitable, but I remind myself that calm, measured responses preserve credibility and decision quality.

63. Editor-in-Chief: What personal philosophy keeps you grounded?

I am guided by the belief that leadership is service, not status. Staying grounded means remaining accountable to God, to the people I serve, and to the values of integrity, humility, and continuous learning. I remind myself that positions are temporary, but character is enduring—and that lasting impact is built through steady, principled work.

64. Editor-in-Chief: What role has family played in your journey?

Family has been my emotional anchor and moral compass. In essence, my family hasn't just been on the sidelines watching my journey; they have been co-travellers on the path. Their patience, perspective, and sacrifices have not only sustained me personally but have also, in a very real way, contributed to the work of the NCCE. Their willingness to adapt and support me, despite the personal cost, is a gift I will never take for granted. Leadership without family grounding is fragile.

65. Editor-in-Chief: What moment in life humbled you the most?

One of the most humbling moments of my life was realising that authority alone does not inspire change—listening does. Early in my leadership, I encountered situations where policies were sound on paper but fell short in practice because the voices of frontline workers were not sufficiently heard. That experience reminded me that leadership is service; it is not about being heard, but about hearing.

66. Editor-in-Chief: What was your most difficult decision as Executive Secretary?

One of the most difficult decisions I had to make was enforcing hard quality-assurance measures that affected institutions and individuals who were well-intentioned but fell short of required standards. Upholding accreditation benchmarks, suspending non-compliant programmes, and insisting on minimum requirements were never comfortable choices, especially where livelihoods and institutional pride were involved. Yet, safeguarding the credibility of teacher education and protecting students' futures had to take precedence. Leadership sometimes demands unpopular choices in the moment, but it is necessary for long-term integrity and public trust.

67. Editor-in-Chief: What do you consider your greatest personal strength?

My greatest strengths lie in my faith in God, resilience, and an unwavering focus on purpose. These anchors enable me to face challenges without losing sight of long-term objectives. They also help me inspire others—encouraging teams to remain committed, disciplined, and hopeful even in demanding moments.

68. Editor-in-Chief: What weakness have you had to actively master?

I have had to cultivate patience in the face of institutional inertia. Large systems move slowly, and meaningful reform takes time. Learning to act firmly without irritation—while sustaining momentum and focus—has been an important personal discipline.

69. Editor-in-Chief: What would your younger self never believe about you today?

That I would one day lead a national institution and help shape teacher-education policy at scale. The weight of that responsibility is considerable, yet the opportunity to contribute meaningfully to national development has been profoundly fulfilling.

70. Editor-in-Chief: What experience shaped your empathy as a leader?

Direct engagement with students, lecturers, Union leaders and communities in Colleges of Education. Listening to their struggles, successes, and aspirations taught me to lead with understanding, not just authority.

H. Personality, Humour & Authentic Self

71. Editor-in-Chief: What brings you joy beyond leadership and work?

I draw joy from pursuits that deepen my faith in God, shared moments with family, quiet contemplation, and reading. Simple pleasures — a thoughtful conversation, a good book, or seeing those under me thrive—offer a lasting sense of fulfilment beyond office or title.

72. Editor-in-Chief: What is one thing about you the public may never guess?

Many may not realise that I am naturally reserved and reflective. Public roles often require visibility and firm decision-making, but away from official duties, I value quiet moments of introspection. Moreso, modest gestures— a staff's quiet commitment—often resonate more strongly with me than public recognition.

73. Editor-in-Chief: If you weren't an academic, what life might you have lived?

I imagine I would have chosen a path in community development or public administration—fields that still centre on service, impact, and nation-building. At heart, my calling is to contribute to people and society, whatever the platform.

74. Editor-in-Chief: How do you rest, reflect, and recharge?

Through reading, meditation, and spending time with my God and family. I also value solitude, which allows me to reflect on decisions and plan strategically without distraction.

75. Editor-in-Chief: What hobby or simple pleasure nourishes your spirit?

I take quiet delight in mentoring young people—often informally, through conversation, guidance, and shared learning. Watching them find direction and grow brings deep personal fulfilment.

76. Editor-in-Chief: How do you handle criticism privately — and publicly?

Privately, I reflect carefully to determine validity. Publicly, I respond calmly and constructively, using criticism as a guide to improve systems rather than as a source of defensiveness.

77. Editor-in-Chief: Describe yourself in three words.

Purpose-driven, resilient, faith-anchored,

78. Editor-in-Chief: What is your most memorable moment with colleagues or students?

Witnessing students attain national recognition for excellence following the reforms we initiated remains deeply memorable. Sharing that moment with colleagues—seeing our quiet efforts translate into visible achievement—brought deep fulfilment. It reinforced my conviction that sustained commitment to teacher development delivers real, measurable results.

79. Editor-in-Chief: What does friendship mean to you?

To me, friendship rests on mutual respect, sincerity, and steadfast support, particularly during demanding seasons. A true companion strengthens one's sense of purpose and offers honest accountability.

80. Editor-in-Chief: What gesture of kindness has stayed with you through the years?

A mentor once offered guidance without expectation of repayment. That selfless generosity of spirit continues to shape my approach to mentorship and leadership today.

I. Faith, Legacy & Enduring Influence

81. Editor-in-Chief: What values shaped your public service ethics?

Reverence for God, integrity, accountability, service to others, and respect for the rule of law have guided my conduct in public service. I believe that principled leadership is the foundation of sustainable reforms and national trust.

82. Editor-in-Chief: Beyond the office, who is Professor Okwelle inside his own silence?

Beyond public duty, I remain a reflective learner, a mentor by conviction, and a devoted family man guided by reverence for God. I cherish moments of quiet contemplation, using them to examine how my service contributes to enduring human development and to renew my sense of purpose.

83. Editor-in-Chief: What message would you leave for future NCCE leaders?

Lead with courage, uphold standards without compromise, and always place teacher quality and student outcomes above expediency. Your legacy is measured by the strength of the institutions you leave behind.

84. Editor-in-Chief: What do you hope history remembers you for?

As someone who reinvigorated teacher education in Nigeria, strengthened standards, and placed NCCE firmly on the path of relevance and reform.

85. Editor-in-Chief: What one principle will you never betray?

Integrity. Without it, reforms lose credibility, policies lose moral force, and leadership becomes hollow.

86. Editor-in-Chief: What proverb summarises your life journey?

"The tallest tree catches the wind, but it is deeply rooted that it stands." This captures my conviction that growth must be anchored in strong values, resilience, and inner discipline.

87. Editor-in-Chief: What footprint do you wish to leave on Nigerian education?

A teacher-education system that is contemporary, accountable, digitally literate, and internationally competitive—producing educators who are principled, skilled, inspiring, and globally relevant.

88. Editor: What would you want a child 25 years from now to learn from your legacy?

That dedication, integrity, and service to others can transform institutions and uplift lives. Leadership is not about power, it is about impact.

89. Editor: When the applause fades, what part of your journey was most meaningful?

The quiet victories—seeing a teacher empowered, a learner succeed, or an institution embrace change—mean more to me than public acclaim.

90. Editor: What is one dream you still carry forward?

To see a nation where every teacher is well-prepared, digitally capable, and deeply respected, equipping generations of learners to thrive and contribute meaningfully to the society.

J. Words to the Next Generation

1. Editor-in-Chief: What counsel would you give young academics today?

"Pursue excellence relentlessly, remain curious, and let your work serve the nation. Titles are fleeting; impact is enduring."

92. Editor-in-Chief: How should emerging scholars prepare for global competitiveness?

By mastering both knowledge and skills, embracing technology, networking internationally, and publishing research that matters. Competence, relevance, and adaptability define global competitiveness.

93. Editor-in-Chief: What habits build greatness quietly?

Discipline, reflection, continuous learning, and humility. Greatness often grows in consistency, not applause.

94. Editor-in-Chief: What would you tell a young leader afraid to fail?

"Failure is a teacher, not a verdict. Courage is acting in spite of fear, learning from mistakes, and returning stronger."

95. Editor-in-Chief: What should a researcher pursue — relevance or recognition?

Relevance first; recognition follows naturally. Research that solves problems, informs policy, and changes lives will always earn respect.

96. Editor-in-Chief: What does academic success mean to you beyond titles?

It is the ability to influence minds, improve practice, and leave institutions better than you found them, not merely accumulating degrees or awards.

97. Editor-in-Chief: What wisdom should guide a scholar's first publication?

Ensure it is rigorous, honest, and contributes something meaningful. Let it reflect integrity and commitment to advancing knowledge, not personal gain.

98. Editor-in-Chief: What one truth should every teacher-in-training hold onto?

"The classroom is a sacred space; your influence shapes the future, and excellence is your responsibility."

99. Editor-in-Chief: What would you like to say to those coming after you?

Lead boldly with sincerity of purpose, prioritise standards over convenience, and never underestimate the power of a committed teacher. Build systems, mentor people, and leave a legacy of integrity.

100. Editor-in-Chief: In one sentence, define the legacy you wish to leave behind.

"A reformed, resilient, and globally respected teacher education system that empowers every Nigerian teacher to inspire generations."

CLOSING REFLECTION: A LEGACY STILL UNFOLDING

As this conversation draws to a close, one truth stands luminous above all: leadership is not a season of applause, but a lifetime of purpose. My journey at the National Commission for Colleges of Education has been one of stewardship — of ideas, of people, and of a future larger than any single office or tenure.

I have learnt that institutions rise when integrity is non-negotiable, standards are protected, and people are believed in. Reforms may begin with policy, but they are fulfilled through conviction. The true measure of leadership is not how loudly one is celebrated, but how deeply one's work empowers others to stand taller, think deeper, and serve better.

To the teachers shaping young minds, the administrators guarding standards, the scholars pursuing truth, and the students daring to dream — you are the heartbeat of education. Never underestimate the quiet power of consistency, ethical courage, and purposeful learning. Nations are rebuilt not by noise, but by knowledge; not by shortcuts, but by standards faithfully upheld.

As I look forward, my hope is simple yet enduring: that teacher education in Nigeria will continue to rise — relevant, respected, and resilient — anchored in values, strengthened by innovation, and driven by service. May those who come after us lead with wisdom, reform with courage, and serve with humility.

For in the end, the greatest legacy of leadership is not what we controlled, but what we inspired — and what we left better than we found it.

Thank you for listening. The work continues.

Yours sincerely

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Professor Eyisi says: Aspire to the zenith! Never look for Very Good where Excellent is possible

SECTION TWO

Academic Papers

PART ONE

Language, Communication, and Society: Contemporary Issues and Evolving Paradigms

> *"Language, apart from being a marker of identity, also marks individuality and national sovereignty."*
> ...***Ayo Bamgbose***

Language is more than a system of expression; it is a powerful social force that shapes identity, interaction, and national consciousness. As Ayo Bamgbose aptly notes, *"Language, apart from being a marker of identity, also marks individuality and national sovereignty."* This insight underscores the central role of language in defining who we are as individuals, communities, and nations. This part examines the dynamic interplay between language, communication, and society in a rapidly changing world shaped by globalisation, digital technologies, multilingualism, and shifting cultural identities. It explores how evolving communicative practices influence social relations, power structures, and collective meaning-making. By situating language as both a communicative tool and a social resource, Part One provides a critical foundation for understanding contemporary linguistic realities and their implications for social cohesion, cultural continuity, and societal transformation.

In his role as Executive Secretary of the National Commission for Colleges of Education (NCCE), Professor Okwelle's leadership has been transformative. He has championed quality assurance, curriculum innovation, and institutional capacity building across Nigeria's colleges of education. Under his stewardship, the Commission has advanced reforms aimed at aligning teacher education with national priorities, global best practices, and the demands of the Fourth Industrial Revolution. His emphasis on professionalism, accountability, and continuous improvement has strengthened the credibility and relevance of the NCE programme as the bedrock of basic education in Nigeria.

Chiduhiegem C. R Wordu

Chapter 1

Language As a Tool for Empowerment: An Assessment of Multilingual Challenges and Strategic Interventions in Promoting Girl-Child Education in The Niger Delta

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Abstract

This study examined language as a tool for empowerment through an assessment of multilingual challenges and strategic interventions in promoting girl child education in the Niger Delta. It was motivated by the persistent gap between the growing advocacy for girl child education in Nigeria and the limited attention accorded to language as a critical instrument of empowerment within multilingual contexts.. In the Niger Delta, educational interventions have largely focused on access and enrollment while overlooking how English dominance, the marginalisation of Nigerian Pidgin, and indigenous languages, along with gendered cultural norms, intersect to shape girls' participation, confidence, and learning outcomes.. These silent linguistic challenges necessitated an in depth investigation of how language practices influence girl child education in the region. The study adopted a qualitative research design grounded in intersectionality theory to examine how gender, language, culture and institutional power interact in educational spaces. Data were collected through in depth face to face interviews with thirty purposively selected stakeholders comprising girl child learners, teachers, school administrators, parents, community and religious leaders, NGO practitioners, and education policy actors.. Participants were allowed to express themselves in English, Nigerian Pidgin or indigenous languages to capture authentic experiences. The data were analysed thematically with attention to intersecting social factors shaping educational experiences. Findings revealed that English dominated classroom practices significantly constrained girls' participation and confidence, particularly for learners from non-English speaking backgrounds.. Strategic use of Nigerian Pidgin and indigenous languages enhanced comprehension reduced anxiety and encouraged participation. The study also found that cultural and gendered norms promoting female silence intersected with language ideologies to limit girls' voice in classrooms. Teacher-student interactions and weak implementation of multilingual policies further reinforced linguistic exclusion and gender inequality. The study concludes that language functions simultaneously as a barrier and a potential resource

for empowering the girl child in the Niger Delta. Multilingual challenges cannot be addressed in isolation from gender and cultural dynamics. It is recommended that schools adopt inclusive multilingual pedagogies; teachers receive training in gender sensitive language practices and education policies integrate language and gender considerations to promote meaningful and equitable girl child education in the Niger Delta.

Keywords: *Girl child education, Multilingualism, Language and empowerment, Intersectionality, Niger Delta.*

Introduction

Education is widely recognised as a critical tool for individual empowerment, social development, and national progress (Mahanta, 2024; Olatunji, 2020). In particular, girl-child education has been identified as a transformative strategy capable of breaking cycles of poverty, reducing gender inequality, and fostering sustainable development (Binuomote, 2023). Globally, governments, international agencies, and non-governmental organisations have emphasised policies and programmes to improve access, retention, and quality of education for girls (Monkman & Hoffman, 2013). In Nigeria, efforts such as the Universal Basic Education (UBE) programme, the Child Rights Act, and various non-governmental interventions seek to address longstanding gender disparities in education. Despite these initiatives, the Niger Delta region continues to experience significant challenges in promoting meaningful and inclusive educational outcomes for girls (Uduji, Okolo-Obasi, & Asongu, 2020; Makai, Familoye, & Diekuu, 2024; Pona, & Ouedrago, 2023).

The Niger Delta is a linguistically and culturally diverse region, characterised by the coexistence of English, Nigerian Pidgin, and a wide range of indigenous languages (Usoro, & Nsit, 2024). This multilingual environment presents both opportunities and challenges for educational delivery. While local languages and Pidgin serve as primary tools of communication and cultural expression (Eke, & Ochuba, 2023). English dominates formal instruction, official curricula, and examinations. This linguistic hierarchy often positions the girl-child at a disadvantage, particularly when English proficiency is assumed as a prerequisite for academic success (Gold, 2025). Moreover, culturally embedded norms about female speech and participation reinforce gendered silence, which can further marginalise girls in classrooms and limit their ability to fully engage with learning (Aiyede, 2023).

The interplay of language, gender, and culture in the Niger Delta is complex. Many girls navigate educational spaces that simultaneously demand English proficiency and adherence to cultural expectations of restraint and humility (Varela, 2025). At

home and in communities, parents may prioritise English for future socioeconomic mobility, while simultaneously discouraging expressive use of local languages in formal settings (Nag, et al., 2019). Teachers and school administrators, constrained by national language policies and curricula, often rely exclusively on English, inadvertently silencing students who are more comfortable in Pidgin or their mother tongue. The result is a layered form of disadvantage where linguistic exclusion intersects with gender norms, socioeconomic conditions, and institutional limitations, shaping the educational experiences and aspirations of the girl-child (Ojong, 2025).

Previous research on girl-child education in Nigeria has largely focused on enrolment, retention, and infrastructural challenges, with limited attention to the linguistic and intersectional dimensions of educational inequality (Manir & Jabbi, 2025, Ige, et al., 2024). Few studies have examined how multilingualism can either empower or constrain learners, particularly girls, within classroom and community contexts (Obiakor, 2024; Jegede, 2025). Similarly, there is scant empirical evidence on how cultural norms, language ideologies, and pedagogical practices intersect to influence girls' participation, confidence, and academic outcomes in the Niger Delta (Onyebuchi-Igbokwe, 2025). This gap is particularly significant given the region's linguistic diversity and the central role of language in socialisation, identity formation, and empowerment.

Understanding the role of language as a tool for empowerment requires attention to intersectionality, a theoretical framework that examines how multiple social identities such as gender, class, language, and cultural background intersect to produce specific experiences of disadvantage or privilege (Crenshaw, 1989). Applying intersectionality to girl-child education in the Niger Delta enables a nuanced analysis of how language-related barriers are compounded by social, cultural, and institutional factors, and how strategic interventions can be designed to address these overlapping disadvantages. Such an approach foregrounds the voices, experiences, and perspectives of girls themselves, while also engaging teachers, parents, community leaders, and policymakers as critical stakeholders in the process of linguistic and educational empowerment (Aiyede, 2025).

In light of these considerations, this study seeks to answer the following research questions:

1. How do multilingual classroom practices and language choices influence the participation and empowerment of the girl-child in schools in the Niger Delta?
2. In what ways do cultural and gendered language norms silently shape attitudes toward girl-child education in Niger Delta communities?

3. How do language-related pedagogical practices and teacher–student interactions affect girls' confidence, voice, and learning outcomes in multilingual classrooms?
4. What institutional and policy gaps exist in addressing language-based barriers to the promotion of girl-child education in the Niger Delta?
5. How do girls' linguistic identities and experiences of language inclusion or exclusion impact their educational engagement and aspirations in the Niger Delta?

Statement of Problem

Despite increasing advocacy for girl-child education in Nigeria, the role of language as a tool of empowerment remains largely under-explored, particularly in the multilingual context of the Niger Delta. Educational policies and interventions often emphasise access and enrolment while overlooking how language choices, classroom discourse, cultural communication norms, and institutional language practices silently shape girls' participation, confidence, and educational outcomes. In a region characterised by the coexistence of English, Nigerian Pidgin, and numerous indigenous languages, the dominance of English in formal education intersects with gender norms, cultural expectations of female silence, socioeconomic constraints, and weak policy implementation to marginalise the girl-child linguistically and socially. These intersecting factors limit girls' expressive agency, reinforce classroom silence, and weaken the empowering potential of education. However, existing studies have paid limited attention to these intersectional and language-based barriers, creating a gap in understanding how multilingual realities can be strategically harnessed to promote meaningful and inclusive girl-child education in the Niger Delta.

Theoretical Framework

This study is anchored on Intersectionality theory. This theory was articulated by Kimberlé Crenshaw in the late 1980s and early 1990s and further developed through the works of Black feminist scholars such as Patricia Hill, Collins bell hooks and Angela Davis. The theory emerged as a response to limitations in single axis analyses of inequality which often examined gender race or class in isolation. Intersectionality advances the position that social identities and power relations are interconnected and that experiences of marginalisation or privilege occur through the simultaneous interaction of multiple social categories rather than through a single social position (Wijeyesinghe, & Jones, 2014).

The basic tenets of intersectionality theory emphasise that systems of oppression including patriarchy cultural domination class hierarchy and institutional power operate in interconnected ways. The theory rejects additive explanations of inequality and instead argues that disadvantage is produced through complex social structures

that reinforce one another. Central to intersectionality is attention to lived experience voice and agency particularly of marginalised groups whose realities are shaped within specific social cultural and historical contexts. Language practices, institutional norms and everyday interactions are therefore understood as key sites where power is negotiated and reproduced.

Varsik, & Gorochovskij (2023) points out that in educational contexts, intersectionality provides a critical lens for understanding how learners experiences are shaped through overlapping factors such as gender, language background, socioeconomic status, cultural expectations and policy environments. Language functions as a powerful social resource and a mechanism of exclusion especially in multilingual societies where certain languages are institutionally privileged. Intersectionality enables an examination of how educational systems may unintentionally reinforce inequality through language policies, classroom practices and assessment norms that favour dominant linguistic identities.

Within the Niger Delta context, intersectionality offers valuable insight into the layered challenges confronting the girl-child in education. Gender norms that encourage silence and deference intersect with the dominance of English and the marginalisation of Nigerian Pidgin and indigenous languages. These intersecting factors influence girls' participation confidence and access to meaningful learning opportunities. Cultural expectations, socioeconomic conditions and institutional practices further intensify these challenges, creating uneven educational experiences among girls across different communities (Nwafor, Eyisi, Olatunji & Eyisi, 2025).

The theory is suitable for this study because it aligns with the focus on language as a tool for empowerment within a multilingual and culturally diverse environment. Intersectionality allows the study to account for the combined effects of gender language culture and institutional structures on girl-child education in the Niger Delta. The framework supports an analysis that moves beyond single factor explanations and provides a holistic understanding of how inclusive language practices and gender sensitive interventions can promote educational empowerment for girls.

Methodology

This study adopted a qualitative research design, employing an interpretive, interview-based approach to examine language as a tool for empowerment in promoting girl-child education in the Niger Delta. The qualitative design was considered appropriate because the study focuses on silent, lived, and context-bound experiences of language use, gender relations, and educational participation that cannot be adequately captured through quantitative methods.

The study is theoretically anchored in intersectionality theory, which provides a lens for understanding how gender, language, culture, socioeconomic background, and institutional power intersect to shape the educational experiences of the girl-child. The design therefore allows for an in-depth exploration of these overlapping dimensions as they are articulated in participants' narratives.

The study was conducted in the Niger Delta region of Nigeria, a linguistically diverse area where English, Nigerian Pidgin, and multiple indigenous languages coexist. The region was selected due to its complex multilingual environment, persistent educational inequalities, and culturally embedded gender norms. These characteristics make the Niger Delta a suitable context for investigating how language functions both as a barrier and as a resource in girl-child education.

The population of the study comprised stakeholders involved in girl-child school education and language use in the core Niger Delta States (Bayelsa, Delta and Rivers States). This included:

1. Girl-child learners in upper primary schools
2. Teachers (language teachers)
3. School administrators/counsellors

Given the wide geographical spread of the Niger Delta and the large number of schools and communities involved, the total population was large and indeterminate. As is typical of qualitative studies, the study did not attempt to enumerate this population but focused on generating in-depth insights from a carefully selected sample.

A total of thirty (30) participants were selected for in-depth, face-to-face interviews using a purposive sampling technique. Purposive sampling was considered appropriate because the study required participants with specific knowledge, experiences, and roles relevant to multilingual practices and girl-child education.

The distribution of the interview participants was as follows:

1. Girl-child learners – 18
2. Teachers – 6
3. School administrators – 6

The sample size was considered adequate for achieving data saturation, ensuring intersectional diversity, and generating rich qualitative data suitable for thematic and discourse analysis.

Data were collected using a semi-structured interview guide developed in line with the five research questions of the study. The interview guide contained open-ended questions designed to elicit participants' experiences, perceptions, and attitudes toward language use, gender norms, and girl-child education.

Participants were allowed to respond in English, Nigerian Pidgin, or indigenous languages, depending on their linguistic comfort. This approach ensured that participants could express themselves freely and that linguistic diversity was respected as part of the research process.

Data collection was carried out through in-depth, face-to-face interviews, with each interview lasting between 30 and 60 minutes. With participants' informed consent, interviews were audio-recorded to ensure accuracy and completeness of data.

Interviews with girl-child participants were conducted in safe, familiar environments, such as school counselling rooms, and in accordance with ethical guidelines for research involving minors. The researcher maintained a neutral and supportive stance throughout the interview process to minimise power imbalance and encourage openness.

The data were analysed using thematic analysis, guided by intersectionality theory. The analysis followed a systematic process:

1. Audio recordings were transcribed verbatim, with Nigerian Pidgin expressions retained.
2. Transcripts were read repeatedly to achieve familiarity with the data.
3. Relevant excerpts were coded and labelled sequentially as Data 1, Data 2, Data 3, and so on.
4. Codes were grouped into themes reflecting intersections of language, gender, culture, power, and policy.
5. Themes were interpreted in relation to the research questions and theoretical framework.

Intersectionality guided the analysis by ensuring that no single variable was examined in isolation; rather, attention was paid to how multiple factors interacted to shape participants' experiences.

Data Presentation and Analysis

Research Question 1: How do multilingual classroom practices and language choices influence the participation and empowerment of the girl-child in schools in the Niger Delta?

The interview data reveal that classroom language practices intersect with gender, linguistic background, and socio-geographical location to shape girls' participation.

Data 1: "When teacher dey talk only English, my mind no dey settle… fear catch me say dem go laugh if I talk."

This response shows the intersection of gender (girl-child) and language ideology (English dominance). English functions as a symbolic gatekeeper, while fear of

ridicule reflects gendered expectations that girls should avoid public mistakes. Intersectionally, the girl is marginalised not simply because of language, but because female speech is more harshly evaluated in formal spaces.

Data 2: "If teacher explain small for our language or even Pidgin, e go clear fast and I fit talk."

Here, Pidgin emerges as an empowering linguistic resource. However, its exclusion reflects an institutional hierarchy that devalues contact languages. The intersection of informality (Pidgin) and gender positions girls as doubly disadvantaged: their preferred linguistic medium is delegitimised, and their voices are already culturally constrained.

Data 3: "Boys go shout answer, but we girls dey reason how to talk am well."

This illustrates how gendered classroom discourse norms intersect with linguistic anxiety. Boys' confidence is socially sanctioned, while girls are expected to be cautious. Intersectionality reveals that language confidence is gendered, not naturally distributed.

Teachers' perspectives reinforce this:

Data 4: "Once I switch briefly to Pidgin… the girls relax and participate more."

This suggests that empowerment emerges when linguistic hierarchies are temporarily disrupted. However, the need for "switching" highlights the absence of institutional support for multilingual pedagogy, showing how policy neglect intersects with classroom inequality.

Research Question 2

In what ways do cultural and gendered language norms silently shape attitudes toward girl-child education in Niger Delta communities?

Cultural language norms intersect with gender ideology, tradition, and education to define acceptable female behaviour.

Data 5: "A girl no suppose dey talk too much… dem go say she rude."

This response demonstrates how language socialisation intersects with patriarchal gender norms. Silence is constructed as virtue for girls, while verbal assertiveness attracts moral judgment. Intersectionality shows that language restraint is a gendered survival strategy, not a personal choice.

Data 6: "School good, but make she no pass herself with grammar."

Here, education is accepted conditionally. Linguistic competence beyond a certain level is perceived as social threat. This reflects the intersection of education,

language, and marriage ideology, where excessive linguistic empowerment destabilises traditional gender hierarchies.

Data 7: "Our proverbs teach girls respect, which sometimes means silence."

Proverbs function as cultural texts that encode power relations. Intersectionally, language transmits ideology, and ideology reproduces gendered inequality. Girls internalise silence as identity.

Religious discourse reinforces this:

Data 8: "Girls are encouraged to listen more than they speak."

Religion intersects with language to legitimise silence as divine or moral obligation. Intersectionality reveals how multiple authority structures—culture and religion—converge linguistically to regulate girls' voices.

Research Question 3

How do language-related pedagogical practices and teacher–student interactions affect girls' confidence, voice, and learning outcomes in multilingual classrooms?

Pedagogical interactions reveal intersections between authority, language ideology, and gendered power relations.

Data 9: "If I make mistake for English, teacher go correct me sharp-sharp… everybody go laugh."

This shows how institutional authority (teacher) intersects with language hierarchy (English) to produce emotional harm. For girls, public correction carries higher social cost due to expectations of perfection and restraint.

Data 10: "Silence better pass embarrassment."

Silence becomes a protective linguistic strategy. Intersectionality highlights how girls adapt to intersecting pressures rather than benefiting from the learning environment.

Teachers' reflections reveal unconscious bias:

Data 11: "Girls' silence is often mistaken for understanding."

This demonstrates how gender stereotypes intersect with pedagogical assumptions. Silence is misread as compliance or comprehension, leading to further exclusion.

Data 12: "Pidgin helps reduce fear, but it is unofficial."

This response shows a contradiction: teachers recognise the pedagogical value of Pidgin but are constrained by institutional norms. Intersectionally, policy ideology overrides learner needs, particularly those of girls.

The school administrator's input reinforces the psychological impact:

Data 13: "Repeated negative linguistic feedback reduces girls' confidence."

Here, language correction intersects with emotional wellbeing, revealing that linguistic practices have long-term identity consequences for girls.

Research Question 4

What institutional and policy gaps exist in addressing language-based barriers to the promotion of girl-child education in the Niger Delta?

Policy gaps reflect intersections between bureaucracy, gender blindness, and linguistic marginalisation.

Data 14: "Mother-tongue policy exists on paper, but no enforcement."

This highlights a structural disconnect between policy and practice. Intersectionality reveals that non-enforcement disproportionately affects girls, who rely more on linguistic scaffolding to participate.

Data 15: "Gender and language are treated separately."

This separation ignores lived realities. Intersectionality argues that language policy without gender consideration reproduces inequality, as girls' experiences are shaped by both simultaneously.

School administrators add:

Data 16: "We lack teaching materials in indigenous languages or Pidgin."

Material absence intersects with regional marginalisation of the Niger Delta and entrenches urban–rural inequality.

The School administrator perspectives expose further silences:

Data 17: "Most programmes focus on enrolment, not language empowerment."

This reveals how numerical access is prioritised over qualitative inclusion. Intersectionality insists that empowerment is incomplete without linguistic voice.

Research Question 5

How do girls' linguistic identities and experiences of language inclusion or exclusion impact their educational engagement and aspirations in the Niger Delta?

Linguistic identity emerges as a site where self-worth, aspiration, and exclusion converge.

Data 18: "Sometimes I dey feel say my language no important."

This reflects internalised linguistic inferiority. Intersectionally, the girl's identity is shaped by language hierarchy, gender marginalisation, and institutional neglect.

Data 19: "I dey try speak fine English make dem respect me."

English becomes a survival tool rather than a learning medium. This reveals how girls perform linguistic assimilation to gain social legitimacy.

Data 20: "Pidgin na my comfort zone, but school no value am."

This illustrates identity dissonance. The school delegitimises the girl's linguistic self, leading to emotional alienation.

Teachers confirm withdrawal patterns:

Data 21: "Girls from minority language backgrounds withdraw easily."

This withdrawal is not individual failure but an outcome of intersecting exclusions.

Parents' responses further complicate identity:

Data 22: "We push English at home… we fear say Pidgin go spoil grammar."

This shows how families internalise institutional language ideologies, inadvertently reinforcing linguistic insecurity in girls.

Discussion of Findings

The study revealed that language plays a central role in shaping the educational experiences and empowerment of the girl-child in the Niger Delta, yet multilingual challenges continue to constrain participation and learning. English dominance in formal classrooms was identified as a significant barrier, particularly for girls from non-English-speaking backgrounds, as it often limited their confidence and willingness to engage in lessons. Conversely, the strategic use of Nigerian Pidgin and indigenous languages was found to enhance comprehension, facilitate participation, and create more inclusive learning environments, highlighting the potential of multilingual approaches as tools of empowerment.

Cultural and gendered norms were also found to intersect with language in ways that subtly restricted girls' voices. Girls were often socialised to remain silent or defer to male peers in both school and community contexts, reflecting deeply embedded expectations about female behaviour. This gendered silencing extended into classrooms, where girls' reluctance to speak was reinforced by fear of ridicule or negative evaluation, affecting their confidence, participation, and overall learning outcomes.

Teacher–student interactions further contributed to these challenges. Pedagogical practices that prioritised English proficiency, coupled with frequent correction of mistakes without supportive scaffolding, inadvertently heightened girls' anxiety and reduced their verbal engagement. Teachers often misinterpreted silence as understanding, failing to recognise the emotional and linguistic barriers that constrained girls' active participation. At the institutional level, weak implementation of multilingual policies and the absence of gender-sensitive teaching strategies compounded the problem, as schools lacked adequate teaching materials and formal structures to support inclusive language use.

The study also found that girls' linguistic identities are shaped by the tension between home, community, and school environments. While Nigerian Pidgin and local languages serve as comfort zones and means of expression, English is framed as a necessary skill for academic and future socioeconomic success. This tension created a sense of linguistic inadequacy among girls, affecting their confidence, classroom engagement, and educational aspirations. Overall, the findings demonstrate that language operates as both a barrier and a potential tool for empowerment, and that meaningful interventions must address the intertwined effects of gender, culture, and institutional practices to enhance the educational experiences of girls in the Niger Delta.

Conclusion

The study concludes that language is a critical determinant of the girl-child's educational experience in the Niger Delta, functioning both as a potential tool for empowerment and a source of exclusion. English-dominated instruction, reinforced by cultural and gendered expectations, limits girls' participation, confidence, and engagement, while the exclusion of Nigerian Pidgin and indigenous languages marginalises learners who are more comfortable in these forms of expression. Intersectional factors such as gender, socio-cultural norms, linguistic background, and institutional practices interact to produce layered disadvantages, making it clear that access to education alone does not guarantee meaningful learning or empowerment for girls. Conversely, when multilingual strategies are consciously integrated into classroom practice and supported by culturally sensitive pedagogy, they have the potential to enhance understanding, build confidence, and foster active participation, demonstrating the transformative role language can play when leveraged effectively.

Recommendations

In light of these findings, it is recommended that;

1. Schools adopt inclusive multilingual teaching practices that validate and integrate Nigerian Pidgin and local languages alongside English to promote comprehension and participation.

2. Teachers should receive professional development on gender-sensitive and multilingual pedagogical approaches that encourage the girl-child's voice while reducing linguistic anxiety.
3. Educational authorities and policymakers should ensure effective implementation of mother-tongue and multilingual policies, accompanied by the provision of appropriate teaching materials and resources.
4. Parents, community leaders, and religious institutions should be sensitised to the importance of inclusive language practices in education, supporting girls' verbal engagement both at home and in schools.
5. Additionally, programmes aimed at empowering girls through confidence-building, self-expression, and recognition of their linguistic identities should be prioritised. 6.Finally, further research should explore innovative pedagogical models and interventions that effectively integrate local languages and Pidgin into formal education to enhance learning outcomes and promote equitable empowerment of the girl-child in the NigerDelta.

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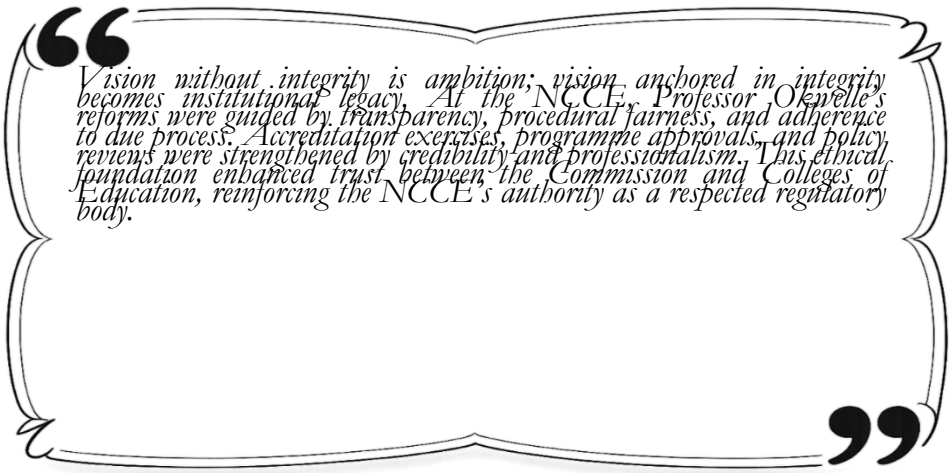
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Author's Biodata

Maureen Ekpelezie Ororho is a scholar and academic in the field of Language and Communication Education. She is a faculty member of the Department of Language and Communication Education at the Federal College of Education (Technical), Asaba, Delta State, Nigeria. Her work is deeply committed to advancing teacher education, enhancing language acquisition and communication skills among learners, and contributing to curriculum development that strengthens the quality and relevance of education in Nigeria. Her areas of specialization include language education, communication skills development, curriculum design, and instructional strategies, with research interests spanning effective language pedagogy, integration of communication skills into teaching and learning, and innovative approaches to teacher preparation. Over the years, she has taught and mentored numerous undergraduate students, fostering both academic excellence and professional competence among future educators. In addition to her teaching and research contributions, Maureen Ekpelezie Ororho is actively engaged in curriculum planning, assessment, and other academic initiatives aimed at improving the standards of teacher education. Her professional commitment and scholarly pursuits reflect her belief that education and effective communication are central to personal, institutional, and national development.



Chapter 2

Language Proficiency and Pedagogical Transformation in ODL for Teacher Capacity Development in Nigeria

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Abstract

The transformation of teacher education in Nigeria increasingly depends on the strategic integration of English language proficiency within Open and Distance Learning (ODL) systems. As education migrates from traditional classrooms to flexible, technology-mediated environments, teachers require robust linguistic competence to engage curriculum content, facilitate learner-centred interaction, and produce high-quality instructional materials. This paper examines how English language proficiency enhances pedagogical effectiveness in ODL institutions, with emphasis on its role in content delivery, academic writing, digital literacy, and assessment practices. It interrogates existing challenges such as limited language support structures, inadequate training in online pedagogy, and disparities in digital access among teacher-trainees. Using a mixed-conceptual analysis supported by empirical studies, policy frameworks, and quality assurance benchmarks, the study proposes a framework for strengthening teacher capacity through integrated language enhancement programmes, reflective pedagogy, and technology-enabled learning tools. The paper argues that improved language proficiency is central to teacher empowerment, academic excellence, and educational sustainability in Nigeria. It concludes by highlighting pathways for reform that align with the ideals of Advancing Education, Empowering Generations, reinforcing the place of ODL as a catalyst for national development

Keywords: *English language proficiency, pedagogical transformation, teacher training, ODL, capacity development, Nigeria.*

Introduction

Teacher education in Nigeria stands at a decisive intersection — one defined by the simultaneous demands of global knowledge economies, digital academic mobility, and the urgent need to strengthen professional competence among teacher-trainees. Central to this evolving landscape is English language proficiency, the medium of instruction across all tiers of education and the conduit through which knowledge, pedagogy, and educational discourse are transmitted. As the Nigerian educational system shifts towards more flexible learning arrangements, notably through Open and Distance Learning (ODL), language competence becomes not merely a communicative skill but a pedagogical asset through which teaching effectiveness may be measured and expanded.

ODL has broadened access to teacher education, enabling wider participation among diverse learners who may otherwise be constrained by geographical, economic, or institutional barriers. Yet as participation expands, so too does the responsibility to ensure that teachers trained within these flexible systems demonstrate strong language-based instructional capacity. In contexts where English proficiency is weak, pedagogical delivery often suffers — lesson planning becomes unclear, feedback loses precision, academic writing lacks coherence, and learners struggle to engage with course materials meaningfully.

This paper therefore argues that English language proficiency is foundational to pedagogical transformation within ODL and critical to the long-term development of the teaching profession in Nigeria. By aligning language competence with innovative instructional practices, capacity development programmes, and digital literacy skills, ODL can produce educators who are not only well-prepared for contemporary classrooms, but also equipped to empower future generations. The study is situated within the broader intellectual spirit of Advancing Education, Empowering Generations, the guiding theme of this Festschrift in honour of Professor Paulinus Chijioke Okwelle — a leader whose contributions to teacher education continue to shape institutional practice and scholarly direction within Nigeria.

English Language Proficiency in Teacher Education

English occupies a central position in the Nigerian educational system, not only as a subject of study but as the official medium through which knowledge is structured, disseminated, and evaluated. For teacher education, language proficiency is therefore more than a communication tool — it is a determinant of professional identity, instructional clarity, and intellectual competence. A teacher's ability to read critically, write coherently, speak intelligibly, and listen actively informs the quality of learning experiences they facilitate, both within conventional classrooms and within ODL environments.

Core Dimensions of Proficiency for Educators

English language proficiency at the teacher-training level manifests through several mutually reinforcing dimensions:

1. **Literacy**
   The capacity to process texts, interpret meaning, and navigate academic discourse. Literacy underpins curriculum engagement, research, critical thought and the translation of theory into instructional practice.

2. **Oracy**
   Spoken fluency, articulation, pronunciation, and communicative effectiveness. In ODL spaces — especially video conferencing, recorded lectures, and collaborative virtual discussions — oracy shapes teacher presence and learner trust.

3. **Writing Ability**
   The skill to construct well-structured lesson notes, assessments, reports, and scholarly arguments. Weak writing ability affects clarity of instruction and perpetuates learning gaps among trainees.

4. **Communication for Instructional Purposes**
   The practical use of language in classroom discourse, feedback delivery, questioning techniques, and learner engagement. This competency determines the depth and quality of interaction, especially in text-based ODL platforms.

English as a Gatekeeper of Professional Competence

Across teacher institutions, evidence shows that teachers with limited English proficiency often experience difficulty translating subject knowledge into teachable content. In ODL settings, where communication is mediated by text, audio, and multimedia, these limitations are amplified. The teacher who cannot interpret academic materials, design coherent learning resources or articulate ideas effectively will struggle to facilitate meaningful learning outcomes.

Thus, English becomes a gatekeeper — opening or restricting access to professional growth, academic participation, and successful classroom practice. In order to empower educators capable of advancing learning in this generation and the next, teacher preparation programmes must therefore prioritise linguistic competence not as a subsidiary skill, but as the spine on which teaching excellence rests.

Pedagogical Transformation in Open and Distance Learning (ODL)

Pedagogy in contemporary education is no longer confined to the four walls of the classroom nor anchored solely on teacher-centred transmission models. The advent and expansion of Open and Distance Learning (ODL) has catalysed a paradigm shift from traditional, text-heavy teaching approaches to dynamic, technologically mediated learning ecosystems. These ecosystems demand new ways of thinking about teaching, new forms of interaction, and new competencies that position the educator not merely as an instructor, but as a facilitator, a learning designer, a digital communicator, and a curator of knowledge.

The Departure from Conventional Pedagogy

Traditional classroom pedagogy in many Nigerian institutions remains largely teacher-dominated and lecture-driven. Knowledge is delivered verbally, learners are passive recipients, and learning outcomes often prioritise memorisation over critical engagement. ODL disrupts this structure fundamentally. In virtual learning environments:

Learners interact through screens rather than fixed seating arrangements

Instruction is accessible asynchronously, beyond timetabled hours

Learning resources become multimodal — audio, text, video, animation, simulation

Students construct knowledge through inquiry, collaboration and reflection

This transformation positions the teacher as a guide who scaffolds learning rather than dictates it. Effective facilitation in this model hinges on linguistic clarity, digital literacy, feedback quality, and the ability to translate ideas into engaging self-instructional formats. Weak language skills therefore undermine not only academic writing, but pedagogical integrity itself.

Emerging Competencies for the ODL Educator

Teacher-trainees preparing for 21st-century practice must develop competencies beyond content mastery. These include:

1. **Instructional Design Skills**
   The capacity to break down content into digestible learning units, sequence concepts logically, and embed questions that activate learner thinking.

2. **Digital Pedagogical Fluency**
   Ability to exploit learning management systems (LMS), video communication tools, discussion forums, interactive quizzes, and e-portfolios.

3. Self-Instructional Writing
Crafting modules that speak directly to learners, anticipate difficulties, and provide exemplars, illustrations, and guided practice.

4. Feedback Literacy
Providing timely, empathetic and constructive responses that support individual learner progression, especially when physical cues are absent. When these competencies intersect with strong English proficiency, the ODL environment becomes fertile ground for learner autonomy, creativity, and sustained academic growth.

The Link Between Pedagogy, Language and Transformation

Pedagogical transformation in ODL is not driven by technology alone — it is powered by the teacher's linguistic ability to shape ideas into meaningful discourse. Technology provides access, but language provides connection. Technology opens the door, but language leads the learner through it. For teacher-trainees, the capacity to write clearly, speak effectively, interpret curriculum resources, and facilitate discourse is therefore inseparable from pedagogy itself.

Through improved language competence, educators can design richer digital learning experiences, expand student participation, elevate assessment standards, and bridge inequities in learner background. The result is not merely instructional success, but generational empowerment — a core aspiration of Professor Paulinus Chijioke Okwelle's vision for inclusive teacher development across Nigeria.

English Language Skills as Tools for Capacity Development

Capacity development in teacher education extends beyond mere qualification; it encompasses the acquisition of practical competencies that enhance instructional effectiveness, communication, innovation, and professional autonomy. Open and Distance Learning (ODL), when bolstered by strong English language proficiency, becomes an engine for building these capacities at scale. Language is the medium through which knowledge is expressed, processed, evaluated, and transferred, making it one of the most powerful tools for shaping competent 21st-century educators.

English for Content Creation and Knowledge Construction

Teachers in ODL settings are expected to develop instructional materials that are not only accurate but also engaging, interactive, and accessible to learners of varying backgrounds. Effective material development requires:

- *clear language expression, avoiding ambiguity and enhancing comprehension;*

- *logical sequencing of ideas, enabling learners to build knowledge progressively;*
- *rich vocabulary and discourse markers, which guide critical thinking;*
- *analytical and academic writing skills, essential for educational scholarship.*

When language proficiency is strong, teachers are able to create modules, lecture scripts, multimedia narrations, and assessment items that speak directly to learners' cognitive levels, increasing retention and deep learning.

Lesson Structuring and Pedagogical Navigation

The structure of a lesson — how ideas are introduced, connected, and concluded — is fundamentally a linguistic act. Teachers with command of English are able to:

- *formulate learning outcomes with clarity;*
- *pose scaffolded questions that stimulate inquiry;*
- *sequence activities logically from simple to complex;*
- *transition smoothly between concepts using cohesive connectors.*

ODL learners depend on the written and spoken word to navigate learning, and poorly constructed instructional messages can derail comprehension. Thus, proficiency becomes synonymous with coherence.

Academic Discourse in Digital Learning Spaces

ODL pedagogy thrives on interaction: discussion forums, email exchanges, video conferencing, peer review, and collaborative writing activities. Participation in these spaces relies heavily on teachers' communication skills. Strong English proficiency enables educators to:

- *stimulate discussion with thought-provoking prompts;*
- *moderate conversations with civility and intellectual depth;*
- *provide personalised, constructive feedback in writing or audio form;*
- *model scholarly tone, referencing, and critical thinking.*

Language thus strengthens teacher presence — especially in asynchronous environments where the educator is "seen" only through text or recorded voice.

Assessment Literacy and Feedback Delivery

Assessment is a defining component of teacher capacity. Through language, teachers articulate expectations, frame rubrics, construct examination items, and provide feedback that guides learner improvement. High-value feedback requires:

- precision in highlighting strengths and weaknesses,
- sensitive language that guides without discouraging,

- ❖ clarity that eliminates confusion,
- ❖ reflective phrasing that prompts self-correction.

In ODL, where face-to-face interpretation is absent, feedback must communicate effectively on its own. Proficient teachers therefore build capacity not merely by scoring work, but by shaping cognition through language.

Challenges Affecting Language–Pedagogy Alignment in ODL

Despite the potential of English proficiency to transform teaching and elevate instructional quality within Open and Distance Learning (ODL), several systemic, pedagogical, sociolinguistic, and infrastructural barriers continue to inhibit its effective integration. Understanding these challenges is essential to developing strategic reforms that strengthen teacher capacity and improve learner outcomes across Nigeria.

Digital Divide and Technological Inequality

The success of ODL depends on access — not only to learning materials, but also to reliable electricity, affordable data, and functional digital devices. In many regions of Nigeria:

- ❖ connectivity is unstable and often expensive,
- ❖ rural learners lack sufficient broadband access,
- ❖ teachers struggle to download, upload, or stream instructional content.

When technology fails, communication collapses, and language cannot fulfil its pedagogical role. Thus, the digital divide becomes a linguistic divide — one that disproportionately affects teachers in underserved communities and widens educational inequality.

Limited Training in Online Pedagogy

Many teacher-trainees and even serving educators enter ODL systems without prior exposure to online instructional models. Their training emphasises content knowledge but rarely equips them with skills for:

- ❖ structuring self-instructional formats,
- ❖ facilitating text-based discussions online,
- ❖ writing for asynchronous learner engagement,
- ❖ designing assessment that aligns with virtual environments.

Without these competencies, teachers possess knowledge but lack the linguistic and pedagogical strategies to transmit it effectively via ODL platforms.

Curriculum Gaps and Fragmented Language Support Systems

Teacher education curricula often treat English proficiency as a discrete subject rather than a cross-disciplinary skill embedded throughout professional development. Consequently:

- ❖ academic writing support is inconsistent,
- ❖ communication skills are not systematically nurtured,
- ❖ language enhancement modules are often non-compulsory,
- ❖ holistic integration of proficiency into pedagogy is weak.

The absence of structured writing labs, language mentoring, or feedback-based improvement cycles limits opportunities for growth and sustained competence-building.

Sociolinguistic Complexity and Multilingual Realities

Nigeria's multilingual landscape, rich in indigenous languages, shapes how teachers use and understand English. While multilingualism is a cultural asset, it introduces pedagogical tensions when standard English proficiency is low. Code-mixing, misinterpretation of academic discourse, and translanguaging without mastery may:

- ❖ reduce clarity of instruction,
- ❖ distort meaning in assessment items,
- ❖ complicate academic reading and writing.

Teachers who lack confidence in English may avoid active participation, leading to passive engagement and reduced effectiveness in ODL contexts.

Performance Inequality Among Learner Populations

ODL programmes attract diverse learners — working adults, rural youths, career-switchers, and students returning to education after long gaps. This diversity widens proficiency variance. Some learners excel in self-directed reading and writing; others struggle with basic academic comprehension. Where language support is limited, disparities deepen, creating inconsistency in learning outcomes and teacher readiness for professional practice (Olatunji, 2025).

Administrative and Institutional Constraints

Institutional policies, assessment structures, and workload pressures can further hinder alignment between language and pedagogy. Heavy teaching loads leave little time for reflective practice, material development, or linguistic improvement. Where administrative priorities do not foreground language competence, reforms lose momentum.

Proposed Framework for Strengthening Teacher Capacity in ODL

To fully harness the potential of ODL in developing competent, articulate and future-ready educators, there is a need for a structured and sustainable framework that integrates language proficiency into pedagogy, assessment, technology use, and professional identity formation. The proposed model — The Language-Infused ODL Teacher Capacity Enhancement Framework (LI-ODL-TCEF) — combines curriculum reform, digital support systems, pedagogy renewal, and institutional collaboration for scalable transformation.

Core Pillars of the Framework

The framework rests on four interlocking pillars, each addressing a key dimension of teacher capacity:

1. Language Enhancement for Academic and Instructional Communication

- *Compulsory proficiency modules embedded across teacher programmes*
- *Writing for academic purposes (APA, scholarly argument, synthesis)*
- *Speaking and oracy workshops for lecture delivery and video recording*
- *Reading circles for critical comprehension and reflective discourse*

2. Technology-Supported Pedagogy for Digital Instructional Practice

- *Guided training in LMS navigation and content uploading*
- *Micro-learning design using multimedia assets and interactive tasks*
- *Synchronous & asynchronous facilitation strategies for diverse learners*
- *Confidence-building for live video teaching and digital presence*

3. Instructional Material Development and Self-Learning Content Creation

- *Step-by-step modelling of module writing*
- *Peer critique sessions for clarity, coherence & accessibility*
- *Use of templates for lesson planning, assessment design, OER adaptation*
- *Integration of visuals, activities, reflective prompts, and exemplars*

4. Assessment, Feedback and Quality Assurance Mechanisms

- *Rubric-guided scoring for fairness & clarity*
- *Constructive, language-sensitive feedback training*
- *Teacher portfolios documenting progress across assessment cycles*
- *Periodic evaluation to measure growth and teaching impact*

These pillars reinforce one another — improvement in language enhances pedagogy, which strengthens assessment practice, while technology expands reach and innovation.

Programme Pathways for Implementation

- To operationalise the framework, the following capacity-building pathways are recommended
- Intervention Key Activities Expected Outcome
- ODL Language Bootcamps Grammar, reading, academic writing, multimodal communication Rapid skill improvement in core proficiency areas
- Digital Teaching Certification for Teachers (DTCT) LMS, video lessons, e-moderation, online etiquette Confident and effective virtual instructors
- Writing Labs and Peer Mentorship Groups Module review sessions, feedback exchange Continuous improvement and collaborative growth
- School-Based ODL Resource Hubs Access to devices, study guides, technical support Reduced digital exclusion and greater participation
- Reflective Practice Journals Weekly reflective writing on teaching experiences Metacognition, self-awareness and professional growth

Sustainability and Policy Alignment

For long-term impact, capacity development must be institutionalised rather than episodic. The study therefore recommends:

- integration of the framework into national teacher training policy;
- continuous professional development linked to career progression;
- partnerships with ICT agencies for broadband expansion;
- funding for writing labs, ODL studios, digital libraries and LMS enhancement;
- periodic evaluation of teacher proficiency benchmarks.

This aligns directly with the Festschrift theme, Advancing Education, Empowering Generations, by ensuring that teachers carry forward not only content knowledge, but communication mastery and technological fluency — skills indispensable to educating future Nigeria.

Implications for Policy, Practice, and Future Research

The integration of English language proficiency within Open and Distance Learning (ODL) teacher education carries far-reaching implications for educational policy, classroom practice, and future scholarship. Recognising language as both a medium and a tool for pedagogy highlights the need for systemic reforms that extend beyond individual competency to institutional and national frameworks.

Policy Implications

1. Curriculum Reform and Language Integration

- ❖ Policymakersmust ensure English proficiency modules are embedded across all teacher training programmes.
- ❖ Standards for language competence should be aligned with ODL delivery models and professional accreditation requirements.

2. Professional Development Mandates

- ❖ Continuous training programmes, including writing labs, digital literacy workshops, and oracy sessions, should be mandated for both pre-service and in-service teachers.
- ❖ Policy should incentivise demonstrable improvements in teacher language skills as part of career progression.

3. Resource Allocation and Infrastructure

- ❖ Government and institutional support must prioritise ICT infrastructure, access to digital libraries, and ODL platforms that facilitate language-based pedagogy.
- ❖ Funding models should support equitable access, particularly for rural and underprivileged teacher-trainees.

Practical Implications for Teacher Education

1. Enhanced Instructional Quality

Teachers with robust English skills can deliver clearer lessons, design more effective instructional materials, and provide precise feedback, improving learner outcomes.

2. Effective ODL Implementation

Competent language use enables teachers to engage learners asynchronously and synchronously, fostering interactive, participatory, and learner-centred environments.

3. Professional Empowerment and Confidence

Mastery of language enhances self-efficacy, allowing teachers to assume leadership roles, mentor peers, and contribute meaningfully to curriculum development.

Research and Knowledge Advancement

1. **Exploration of Multilingual Contexts**
   Future studies can investigate how teachers' first languages interact with English proficiency in ODL settings, informing culturally responsive pedagogies.

2. **Assessment of Pedagogical Outcomes**
   Empirical research can measure the impact of language-integrated ODL frameworks on learner performance, engagement, and teacher effectiveness.

3. **Innovation in Digital Language Pedagogy**
   Studies on AI-assisted writing tools, interactive content development, and adaptive feedback mechanisms can inform next-generation teacher education practices.

Bridging Policy and Practice

Ultimately, aligning policy frameworks with teacher development strategies ensures that English proficiency is not an ancillary skill, but a core component of professional preparation. When implemented, these measures will empower educators to deliver high-quality instruction, enhance student engagement, and contribute to the broader goal of national development, reflecting the guiding spirit of Advancing Education, Empowering Generations.

Conclusion

The exploration of English language proficiency as a catalyst for pedagogical transformation in Open and Distance Learning (ODL) underscores a fundamental truth: language is not merely a medium of instruction, but the lifeblood of effective teaching, professional identity, and learner empowerment. Teachers who command the English language are better equipped to structure lessons coherently, design engaging instructional materials, facilitate meaningful interaction, and provide precise, constructive feedback. In ODL contexts, where physical presence is minimal and communication relies heavily on text, audio, and multimedia, these competencies are indispensable.

This paper has articulated the multifaceted ways in which English proficiency enhances teacher capacity, highlighting its role in content creation, lesson structuring, academic discourse, and assessment. It has identified systemic challenges — including technological inequality, inadequate training, curriculum gaps, and sociolinguistic complexity — that impede the alignment of language and pedagogy. In response, the proposed Language-Infused ODL Teacher Capacity Enhancement Framework (LI-ODL-TCEF) offers a structured, sustainable pathway

for developing teachers who are linguistically competent, technologically adept, and pedagogically innovative.

The implications for policy, practice, and research are clear. Integrating language proficiency into teacher preparation is not optional; it is a strategic necessity for national educational development. When implemented, this framework promises to empower teachers to deliver high-quality education, elevate student outcomes, and, most importantly, contribute to the generational advancement envisioned by Professor Paulinus Chijioke Okwelle.

In honouring his legacy, this study affirms that advancing education and empowering generations begins with equipping educators with the language, skills, and confidence to transform learning spaces, both virtual and physical. ODL, when harnessed effectively, thus emerges as a powerful instrument for sustainable teacher development and national progress.

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Author's Biodata

Joy Chinwe Eyisi (née Okpala) is a dual-PhD scholar in English and Open and Distance Learning (ODL), an award-winning educator, and a distinguished professor at the National Open University of Nigeria (NOUN) whose academic footprint spans over three decades of exceptional teaching, research, and scholarship. A trailblazer in higher-education leadership, she has served as the first female Deputy Vice-Chancellor (Academic) of NOUN, pioneer Study Centre Director at the National Assembly, Abuja, and currently Chairperson of the Committee of Deans and

Directors as well as Director of SIWES, where she leads transformative initiatives in digital learning, academic quality, and student development. Her scholarship, grounded in ESL, literacy studies, ODL pedagogy, and educational leadership, reflects depth, originality, and global relevance — earning her prestigious accolades, including the historic recognition as the first Nigerian recipient of the International Academy of Linguistics and Social Sciences (IALSS) Award in New Orleans, USA. Widely respected as a mentor, supervisor, editor, orator, and thought-leader, Professor Eyisi embodies excellence, innovation, and intellectual grace — a voice committed to shaping minds, advancing knowledge, and inspiring future generations.

Chapter 3

Advancing Art Acivities and Children's Literature Using African Storybook (ASB) Initiative in Curbing Child Labour and Human Trafficking

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Abstract

The menace of child labour and human trafficking are some of the societal vices in the modern world that have appeared to defy many solutions. Their devastating effects on individuals and the society are manifold, including non-access to education as a means of self-emancipation and the rise in crime rate. Government's effort at combatting these dastardly trends through the National Agency for the Prohibition of Trafficking in Persons (NAPTIP) and Non-Governmental Organizations (NGOs) appear not to have yielded the desired result. Hence, this paper explored the potentials of literacy activities, including the African Storybook initiative and visual arts, whose persuasive functions could be harnessed to appeal to the conscience of the perpetrators of these unwholesome acts. The paper suggests that literary artists and African storybook makers could craft modern day themes in the story lines of their works that lampoon and mirror such evils in society. Individuals could imbibe the reading culture by reading literature that condemns such practices. It also suggests that images that depict these evil practices could be painted on walls of public buildings as murals to be viewed, an act that could dissuade people from engaging is such inhuman acts.

Keywords: *Child Labour, Human Trafficking, Literature, African Storybook initiative and Creative Arts*

Introduction

The assistance given by children to their parents and other elders in some cultures and in parts the world is not a new phenomenon. This usually takes the form of helping on the farm, market place and around the house, as soon as they are old enough to perform such chores. Many people have passed through this stage and have become successful career persons, which would have been a mirage if they had grown up with their biological parents. It had been an accepted practice to have children of relations/friends grow up with a foster family to receive education in turn for the services they would render in such homes. For some parents who appear to be oblivious of their roles in child rearing, they consider other families more capable in this aspect and readily relinquish their parental control to surrogate parents who they consider more accomplished in that aspect (Grusec & Danyliuk, 2014).

Regrettably, this practice has assumed a new dimension, as children are exploitatively used to provide financial gratification to their parents/guardians through forced labour. This has thrown many children of school age out of school who are now keeping shops, porting goods, baby-sitting, begging for alms (Almajiris), while others are used for redeeming debt bondages and a host of other demeaning jobs (Oloko, 1992; Salihu & Chutiyami, 2016). It is on this note that Nigeria has been identified as the source, transit and destination country for women and children who are victims of trafficking in persons including forced labour and forced prostitution. Trafficked Nigerian women and children are recruited from rural areas within the country's borders for involuntary domestic servitude and sexual exploitation, and boys for forced labour in street vending, domestic servitude, mining and begging. This has found Nigerian women and children in West, North and Central African countries, Europe (Italy, Russia) and the Middle East (US Department of State Report on Human Trafficking, 2010). Not only that, the lives of these children have been put at a risk as reports from local and the international press are awash with reported incidences of killings of Nigerian ladies in Italy (Aljazeera, 2018; Metro Plus, 2019).

This is a contravention of the child rights act of the United Nations Convention of the rights of a child (1989), which defined a child as a young human being who is below 18 years old. It is a human rights index in any society today. Similarly, the 24th article of the International Convention on the Civil and Political Rights of (1996) states that; "every child shall have the rights to such measures of protection as are required by his status as a minor on the part of his family, society and the state". This declaration is not heeded to in some parts of the world as can be attested to in the foregone discussion. The Nigerian government through the National Agency for the Prohibition of Trafficking in Persons (NAPTIP) and in conjunction with other Non-Governmental Organizations (NGOs) like Women Trafficking and Child Labour Eradication Foundation (WOTCLEF) have tried to stem the tide of child

trafficking and labour to no avail. Children of Nigerian extraction are being trafficked in some parts of the world for sexual exploitation and otherwise, hence the position of this paper to explore the persuasive functions of literature and visual art activities that communicate positive messages as well as mirror the evils of child labour and trafficking.

It is based on the postulation above that the possibility of advancing art and literature activities, including the African storybook initiative as two creative forms that have been intertwined throughout history was explored. Both forms of expression seek to explore the human experience, conveying emotion and meaning through the use of language and imagery. This intersection of art and literature is important in society because it allows us to explore and express the human experience in different ways that can challenge societal norms and provoke thought and reflection (Okay, 2023 & Rao, 2024).

Child Labour

The Encarta Dictionary (2008) defines the term child labour as "the full time employment of children, especially those who are legally too young to work". The term also denotes the employability of minors generally, especially in work that may interfere with their education or endanger their health. It is worthy to note that the term refers to all forms of exploitative use of children for financial gains not minding the endangerment of their health, safety and education. Child labour has constituted a menace to society in the 21st century, when civilization and globalization ought to have attained their peak. According to the Microsoft Student (2008), Child labour remains a serious problem in many parts of the world. Studies carried out in 1979, the International Year of the Child show that more than 50 million children below the age of 15 were working in various jobs often under hazardous conditions. Many of these children live in under developed countries in Latin America, Africa and Asia. Their living conditions are crude and their chances for education minimal. The meagre income they bring in however, is necessary for the survival of their families. Frequently, these families lack basic necessities of life like adequate food, decent clothing and shelter, and even water for bathing.

The causes of child labour include poverty, disease and industrialization. Its consequences are numerous and dire, including illiteracy, the spread of HIV/AIDS and prostitution among others (Oloko, 1992). This problem prevails not only in Africa and other developing countries alone but in countries where poverty does not exist, including some parts of Europe and the United States of America as well (Encarta Year Book, 1997).

Attempts at combatting child labour by the International Labour Organization (ILO) according to the Encarta Year Book (1997), include, the introduction of the following child labour conventions among its member states;

- Minimum age of 16 years for admission to all work,
- A higher minimum age for specific types of employment,
- Compulsory medical examination,
- Regulation of night work.

What constitutes child labour to them includes slavery, prostitution, debt bondage (the practice of requiring children to work off loans made to their parents) and forced military service. Voluntary compliance of member nations is often relied upon for the enforcement of these child labour laws.

In Nigeria, the major attempt towards fighting child labour and child (human) trafficking is through NAPTIP, the governmental agency that came into existence on 26th August, 2003. This body was formed to fight the scourge of trafficking in persons and other forms of human rights abuses that thrive in Nigeria. This was in fulfilment of its international obligations to the Transnational Organized Crime Convention which Nigeria became a signatory to in the year 2000.

The bill to implement this protocol into the National Penal Legislation was sponsored by WOTCLEF, an NGO founded by Mrs TIti Abubakar, wife of the then Vice President of Nigeria, which was then passed by the National Assembly on 7th July, 2003. This bill vests in NAPTIP the powers to fight all forms of trafficking in persons and related offences punishable under section 4 of the law (https://www.naptip.gov.ng/).

Plausible as these measures mentioned above are in fighting all forms of dastardly acts committed against children, the problems still persist as reports of these cruel acts against Nigerian children are still reported at home and abroad (Salihu & Chutiyami, 2016; Aljazeera, 2018; Nadeau, 2018; Metro Plus, 2019). It therefore becomes apparent that other ways of fighting all forms of crimes against children, who are leaders of tomorrow be sought. Hence, the proposition here to explore the potentials of insights from literature texts that exposed and condemned cruelty and its related forms to children, as well the exhibition of acts inimical to children's rights as murals on walls of public spaces to appeal to the conscience of the reading and viewing public.

Human Trafficking

The United Nations Convention on Transnational Organized Crime and its protocols on trafficking in persons and migrant smuggling defines human trafficking as,

- the acquisition of people by improper means such as force, fraud or deception, with the aim of exploiting them, while smuggling of migrants involves the procurement for financial or other material benefit of illegal entry of a person into a State of which that person is not a national or resident.

- They maintain that, these complex crimes remain topics of concern in Nigeria as it is a source, destination and transit country. Young women and girls are particularly vulnerable as they are trafficked to other African countries, Europe or in the Middle East where they are forced into sex work (UNODC, 2019).

Causes of Human Trafficking

- These are not quite different from those identified to be the causes of child labour but human trafficking victims are mostly young women and girls.
- Corruption, poverty, social and cultural factors have been identified as the causes of human trafficking.
- Government agencies who are supposedly assigned the task of fighting this evil are doing so with levity, often collecting gratification from offenders and setting them free.
- Victims of conflicts are on the increase. Many girl children have been totally or partially orphaned by conflicts and are left at the mercy of their benefactors (Okeshola & Adenuga, 2018).

The Role of Literature in Curbing Child Abuse and Human trafficking

Literature serves many other functions in society today through cultivating empathy and reading the minds of others, make the familiar seem strange, reflect on human nature and enact social change (Farley, N.D.) Research on narrative persuasion suggests that immersion into narratives can result in attitude, belief and behaviour change (Greene & Brock, 2000; Vaughn, Hesse, Petkova & Trudeau, 2009; Mazzocco, Green, Sasota & Jones, 2010; Williams, Greene, Houston & Allison, 2011). Hormes, Rozin and Fincher (2013), argue that, "Well written or compellingly argued books are often described as "life-changing". Readers feel that their eyes have been opened to a new way of seeing the world, and they intend to change their behaviour to match their new understanding". It is with this view that readers' minds will be tuned to condemn and denounce acts of violence and cruelty towards children.

The Novel in the Victorian Era

The novel gradually became the dominant form in literature during the Victorian Age. This era was so called because of the coronation of Queen Victoria in 1837 till her death in 1901. It was an era of several unsettling social developments that forced writers more than ever before to take positions on the immediate issues animating the rest of the society. Dicken's novels of contemporary life (Oliver Twist, 1838; David Copperfield, 1849-1850; Great Expectations, 1861; Our Mutual Friend, 1865) all exhibited astonishing ability to create living characters; his graphic exposures of social evils and his powers of caricature and humour won him a vast readership, as will be shown in the novels reviewed below by Microsoft Student (2008).

Oliver Twist – Charles Dickens (1838)

Oliver Twist, an orphan brought up at a 'charitable' institution 'where twenty or thirty other juvenile offenders against the poor-laws rolled about on the floor all day, without the inconvenience of too much food or too much clothing'. After nine years, Oliver graduates to a workhouse for young orphans. There his starving fellow sufferers elect him to ask for more food, in punishment for which Oliver is sold to an undertaker. Eventually, Oliver runs away, making his painful way to London. Penniless and hungry, Oliver is befriended by a young thief, the Artful Dodger, who introduces him to Fagin and his gang, the evil Bill Sikes, and Sikes's lover, Nancy. Steadfastly resisting the criminals' attempts to corrupt him, Oliver eventually escapes, discovers his true parentage, and receives the respect he deserves.

According to Beacham's Guide to Literature for Young Adults, Dickens wrote Oliver Twist to identify social problems such as the work house system, ineffective legal establishment and the suffering caused by poverty. But as always, Dickens' deepest concern was with individuals. He championed self-sacrifice, benevolence and charity and he suggests that personal happiness and social progress can only occur as individuals develop these traits.

Jane Eyre – Charlotte Bronte (1847)

Jane Eyre stresses the virtues of self-reliance and perseverance in a world of adversity. Jane's impassioned resilience allows her to overcome the injustices heaped on her by Mrs Reed, John Reed, Mr Brocklehurst, Miss Scatcherd and Blanche Ingram. A sensitive young woman who refuses to be calloused by her hard life, Jane pursues an independent, self-governing existence, making her in a sense, a prototype of champions for women's rights.

The novel also addresses the theme of children victimized by corrupt parent figures. Like Charles Dickens' Oliver Twist, Jane is a pariah, stigmatized simply because she is an orphan, and denied the protection of the law. The plight of Jane and the other orphaned girls at Lowood demonstrates the warped and alienated values of Victorian social welfare schemes, which implicitly presumed a spiritual and intellectual depravity on the part of orphans equal to the children's social deprivation. In a sense, the comfortable classes shut away the offspring of the less fortunate classes as a means of avoiding emotional entanglements; they rationalize their actions with protestations of charitable intentions and moral righteousness (www.bronte.com).

David Copperfield – Charles Dickens (1850)

Copperfield's father died before his birth. He was quite content spending his early years with his mother and the family's beloved housekeeper, Peggotty. He was the centre of their lives, but his situation was not to last. Edward Murdstone, a character akin to the stereotypical Victorian villain, woos his mother. Dickens combined the

words 'murder' and 'stone' to form the name and Murdstone is murderous in his attitude toward the small boy and his overly pliant mother, Clara. Upon returning from his visit to Pegotty's home in Yarmouth, David learns of his mother's marriage, and Murdstone immediately takes charge of the boy. He has the firmness of stone, and firmness is the quality he expects in the people around him. The relationship between children and parents is a theme in many of Dickens' books. David and his mother are in the hands of a sadist, of two sadists because Murdstone's sister, who is cast in the same mold soon joins the family. David is soon informed that any resistance to his stepfather will lead to a beating. The threat is carried out a few days later when David is whipped within an inch of his life for being slow to learn his lessons. In the process, he enrages Murdstone further by biting his tormentor's hand (Beacham's Guide to Literature for Young Adults).

Cinderella – Charles Perrault (1697)

After Cinderella's father dies, her stepmother and stepsisters treat her like a servant girl. With the help of a fairy godmother and her whimsical animal friends, Cinderella manages to go to a big ball, where she and Prince Charming fall in love (https://imdb.com/title/tt004066).

Things Fall Apart – Chinua Achebe (1958)

Ikemefuna comes to live with Okwonkwo's family as a oeace offering from Ikemefuna's home tribe for killing af an Umofian daughter. From the beginning, Ikemefuna fills the void in Okonkwo's life that Okwonko's own son cannot. Okwonko appreciates Ikemefuna for the example he sets for Nwoye. Ikemefuna lives with Okwonko for three years. The tribe then agrees to kill Ikemefuna because the Oracle of the Hills and the Caves has requested it (Microsoft Student, 2008).

Empathy in Literature

Empathy is the feeling of what the victims feel, even if the other person is fictional. Readers may identify with the victimized hero/heroine, be it a romance, spy in a thriller or with the detective in a crime story. It denotes the engagement with characters that are portrayed in representational works of art. (Lindhé, 2016; Joanna, 2017). According to Elliot (2010), "to imagine and to feel the pains and joys" (82).

Lindhé (2016) asserts that,

The notion that the act of reading literature expands our empathy is a popular one. The idea that reading develops our ability to shift perspectives and that it enhances our understanding of unknown others, is often heard in academia as well as beyond. Martha Nussbaum believes that the empathy induced by reading literature can have an influence on a person's moral development and even prompt altruistic behaviour

in the real world, a contention she shares with many other philosophers and with (developmental psychologists) (19).

In the same vein, Wilson &Wilson (2024) affirm that, Literature creates awareness by immersing readers in diverse lives, fostering empathy, challenging norms, and highlighting societal issues like inequality or environmental crises, acting as a powerful tool for social change by shaping perspectives and inspiring action, it builds social consciousness by reflecting reality, exposing biases, and allowing readers to experience different cultures and historical contexts, transforming them into more understanding and engaged citizens.

The overall effect of reading literature whose themes ridicule societal evils like child labour and human trafficking is the arousal indelible apathy to the scourge. A permanent hatred for the likes of Mrs Reed, Fagin, Bill Sikes, Murdstone, Cinderella's step mother and Okwonko, among others in the literary works reviewed here is a general feeling of readers towards these villainous characters. The readers on the other hand empathize with the victims, ordinarily, not practicing what they condemn and they may constitute an advocacy to fighting the ugly trend.

The African Storybook Initiative

The African Storybook (ASb) is a literacy initiative that began in 2014 to address the lack of accessible storybooks in African languages. Its purpose is to improve literacy and provide accessible storybooks for early reading in African languages by the South African Initiative for Distant Education (SAIDE), a non-profit organization in Johannesburg, South Africa.

The ASb has a website with thousands of open access or openly licensed picture storybooks in over 200 African languages, including those of Nigeria. The website also has tools for creating, translating, and adapting storybooks. The ASb has a Reader App and a Maker App that allow parents and children to read and create storybooks. The apps are available for download from Google Play and the iStore.

The ASb has helped to address the shortage of storybooks in African languages, which is a major factor that is contributing to low school literacy rates in many African countries. The initiative addresses the dire shortage of children's storybooks in African languages crucial for children's literacy development. As of March 2023, the website had 3 800 original titles, 7 266 translations and 236 languages represented (Wikipedia,).

The rationale for African storybook use hinges on the UNESCO's 2013/2014 Education for All Global Monitoring Report, 30 million children in sub-Saharan Africa are out of school and over half of the children who reach grade 4 are not learning the basics in reading (UNESCO, 2014). The dearth of children's reading materials available in Africa, especially in African languages is one of the challenges

that provide a major push for the Asb (Welch, T., Tembe, J., Wepukhulu, D. Baker, J. & Norton, B., 2016).

Some ASb titles that portray females in the positive light include but are not limited to the following; Clever nomusa by Zandile Malaza, Ann interviews AI – Nina Orange, Mama Sophie the brave one by Thandiwe Dlodlo, Little leaders: plan for education by Apelles Francis, Katitu Momambo, the clever girl, a traditional story and A tiny seed: The story of Wangari Maathai by Nicola Rijsdijk and Mays Marshak. The titles mentioned above and many others could raise awareness by making marginalized experiences visible, fostering empathy through character connection, shaping social consciousness by challenging norms, and sparking activism, effectively educating readers on complex issues like social injustice, cultural differences, or environmental concerns by framing problems and offering diverse perspectives (Wilson & Wilson, 2024).

Much of the asb story books are authored by African authors whose content range from traditional folktales, contemporary stories, adventure to poems, traditional games and songs. Other features include feminine gender portrayer that have a tendency to be emulated as the female characters could become role models to imitated and celebrated.

Empathy and Visual Arts

Visual arts and access to aesthetics is seen to be one of the finest means of shaping individuals' personality and moral values in society today. It refers to those art or artistic elements that have both aesthetic and functional values. It designates those arts and addresses primarily the sense of vision. They encapsulate both fine and applied arts as opposed to dramatic and performing arts (Uzoagba, 2002).

In the same vein, Okoli (2006) sees visual arts as "forms of expression that evoke responses which are usually perceived and appreciated". They come in two forms of, orthography (writing according to standard usage) and iconography (representation by pictures, diagrams and images) with the aim of conveying an idea, message or emotions.

Art forms have served various purposes from decoration, worship, commemoration, monuments, amusement and beauty. These contribute to the perception, appreciation, criticism, expression response and education, and are viewed as vehicles through which an individual comes to know and react to the world around him.

Barnes (2007) proposes four functions of as communication, recording appearances, making visible the invisible and delighting. The purpose of communication will be examined here for the singular reason that communication of art works will bring enlightenment on the evils of child labour and human trafficking with a view to changing the mind sets of individuals are into this gory business and those of would-

be traders in this despicable trade. Barnes (2007), sees communication as the process of information exchange in various forms between two or more individuals to persuade or change the behaviour either negatively or positively. It is a process of sharing information, ideas, thoughts and emotions between a source and receiver, the reduction of uncertainties for appropriate action (Ofoefuna, 1992). Communication enables us to establish commonness with someone. These occur when people share a common view by the act, whether it is verbal, visual or symbolic. For example, art that adorns churches communicate by sharing religious beliefs to worshippers, instilling the right type of norm and values to the society. This purpose of art has close affinities with literature, which communicates the evils in society through ridicule and lampoon with a view to correcting them as well. The use of visual art in eradicating child labour and human trafficking is considered imperative and an effective tool through the following forms of art;

Mural Paintings These are decorations or paintings on walls or ceilings for aesthetic or didactic purposes and could portray themes of various topical issues including child labour and human trafficking or drug abuse with a view to raising public awareness on such issues. The potency of wall murals in conveying positive messages and equally receiving positive or the desired reactions have been attested to in India, where Mogul (2016) reports the initiative by Raashi Raghunath's project MAD (Murals and Doodles). It was an attempt by this 17 year-old to stop people from her country from defacing walls of public buildings by spitting and urinating on them that birthed project MAD. She teamed up with 3 other artists and together they not only gave the walls a turnaround, but left powerful life changing messages ranging from social issues HIV/AIDS, safe sex, drug abuse, gender equality and others.

Unfortunately, the paintings are not yet safe as even the most beautifully painted walls are defaced. Her joy is that," the response is astounding. People passing by stop and talk to us, take photos or even ask to help paint. People like to see happy things and this one such activity, which remains even when we are done".

Other successful efforts reported are those of the wastewarriors, safe animals, safe kids by BZTAT, the red dirt website by Christina Eldridge and Dawn Taylor, water tank art by Eteri Chkadua in new York city. Others are Rhinosaur to fight poaching in Cape Town, South Africa, Dead bee art by Sarah Hatton, a Canadian Visual Artist and a Nigerian artist, Charles Okereke's The Canal People: Our Reflection, a statement on how we are a reflection of the environment around us. Anyforty/CALM Charity show exhibition by Ben the Illustrator. Campaign Against Living Miserably (CALM) a UK charity in 2014 put together a show with 27 artists who created artworks based on the word 'Hapiness' (Hornor, N. D.).

Billboards and Banners – These are forms of mass commercial mass communication sponsored messages in pictures with or without text, depicting the vulnerability of

children may be placed on banners at strategic locations with the aim of reaching its targeted audience (Robb, 2008). Banners are used for different purposes that include announcement of meetings, product advertisements, political campaigns and advocacy. According to Kayode (2005),

Graphic designs provide a civil mechanism for visual education and correction. Massive campaigns against anti-social behaviours through the use of visual design concepts is as well suitable. It transcends mere drawing and colouring activities and presents itself as a communication channel that has implication channels for mass mobilization (16).

A study about billboard advertising called the Arbitron National In-Car Study reports that billboard advertising was found to be effective on drivers. Here are few statistics the study reported:

71% of Americans consciously look at billboard messages while driving and many learn about an event or restaurant they later attended.

37% report looking at an outdoor ad each or most of the time they pass one.

58% learned about an event or restaurant they were interested in attending by viewing a roadside billboard.

56% of Americans mentioned a billboard they found funny in conversation

26% noted a phone number written on a billboard and 28% noted a website address written on a billboard (Ranmai, 2017).

The Federal University of Technology Abeokuta, Nigeria, successfully used designed graphic communication materials on banners and bill boards to wage war against campus vices such as examination malpractice and cultism (Kayode, 2015).

Individuals need to be sensitized to make correct choices in life everywhere using the correct communication channels as in the foregone discussion. Sponsored messages on billboards and banners condemning child labour and human trafficking could go a long way in making an inroad towards the destruction of these social vices by appealing to the conscience of the perpetrators of these acts to desist from them.

Cartoons – Cartoons are opinionated drawings on paper that create humour and stire in newspaper or magazines, with or without text. It is a graphic representation typically designed in a one-panel non continuing format to make an independent statement on political events or social policy (Edwards & Wrinkler, 1987; Kunzle, 2008).

Abraham (2009) opines that despite the perception in some quarters that cartoons constitute an important medium for framing social issues, they are often dismissed on the grounds of political absurdity and ideological insignificance. Cartoons are

seen as offering just passing chuckles rather than any deep reflection on social issues. The perception may be related to the cartoon's discursive spatial limitation and its very nature as a visual mode of communication. He further asserts that visual modes of communication are deemed deficient in performing analytical communication. By grounding cartoons within a theory of visual semiotics and visual persuasion, this paper attempts to address some of the concerns raised about the effectiveness of editorial cartoons. It attempts to find out how cartoons, as uniquely visual forms of communication, signify their meanings and manage to offer deep reflection, rather than just simple passing chuckle on social issues.

One or a combination of these forms of art could go a long way to addressing the issue of child labour and human trafficking considering their ability to achieve the desired effect. This could be possible in Nigeria when all the bodies, governmental

and non-governmental engage in eradicating this evil from the face of the earth.

Conclusion

Child labour and human trafficking practices are some evils that could be responsible for the alteration of children's lives, leaving them no room to live and achieve their dreams. These evils have been occasioned largely by poverty, ignorance, war and the spread of HIV/AIDS among others. These evil practices have evaded many solutions meant for their eradication. This paper explored the potentials of reading Victorian prose and others as well as engaging various forms of visual art activities to sensitize the teeming population about the evils of this obnoxious practice.

Suggestions

In order to combat child labor and human trafficking, the following recommendations have been proffered;

i. The inclusion of Victorian prose in the senior secondary school syllabus and its abridged version in the basic education, to ensure that right from the early stage children read about these evils and despise it.
ii. The reading culture should be revived among Nigerians through the formation of reading clubs with Victorian prose and related prose making the reading list.
iii. Murals should be painted on the walls of public buildings, most especially in places where the practice is prevalent.
iv. Art exhibitions should be organized regularly, whose themes revolve around child labour and human trafficking to sensitize the viewing public.

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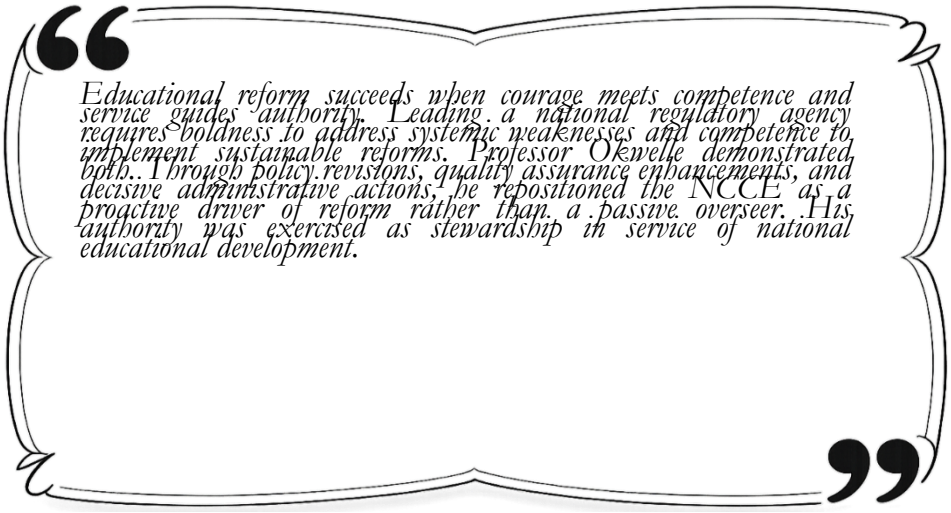
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Chapter 4

Language Of Instruction and Academic Achievement: Revisiting the Debate on Mother Tongue Education in Nigeria

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Abstract

The choice of language of instruction is a critical determinant of educational quality and learner achievement in multilingual societies. In Nigeria, despite policy provisions supporting the use of mother tongue or the language of the immediate environment in early schooling, English continues to dominate classroom practice. This article revisits the debate on mother tongue education by synthesizing theoretical perspectives and empirical evidence to interrogate the relationship between language of instruction and academic achievement. Drawing on sociocultural theory, cognitive load theory, and the linguistic interdependence hypothesis, the paper argues that sustained mother tongue–based instruction enhances comprehension, cognitive development, classroom participation, and learning outcomes, particularly at foundational levels. A critical review of Nigerian studies and comparative evidence from other multilingual contexts demonstrates that early and exclusive English-medium instruction often leads to surface learning and weak literacy foundations. The paper identifies structural, attitudinal, and policy-related constraints that undermine implementation in Nigeria and proposes a phased, context-sensitive multilingual education framework that integrates mother tongue instruction with the gradual acquisition of English. The study contributes to international scholarship on language-in-education policy by offering evidence-based, contextually grounded recommendations for improving academic achievement in linguistically diverse settings.

Keywords: *Language of Instruction; Mother Tongue Education; Academic Achievement; Multilingual Education*

Introduction

Language is not merely a medium of communication; it constitutes the central instrument through which learning, cognition, and social interaction are mediated in formal education. As the principal conduit through which curriculum content is accessed, negotiated, and assessed, the language of instruction profoundly influences learners' comprehension, conceptual understanding, and overall academic performance (Cummins, 2000; UNESCO, 2003). In multilingual societies, the selection of an instructional language presents complex pedagogical, sociolinguistic, and policy dilemmas, intersecting with issues of identity, cultural continuity, social equity, and access to opportunity (Benson, 2004; May, 2012). Nigeria, as one of the most linguistically diverse countries in the world, vividly illustrates these challenges.

Nigeria is home to over 500 indigenous languages, spanning multiple language families and representing rich repositories of culture, indigenous knowledge, and epistemic diversity (Adegbija, 2004; Bamgbose, 2011). Despite this linguistic heterogeneity, English has been institutionalized as the official lingua franca and the dominant medium of instruction throughout the formal education system. While English facilitates interethnic communication, higher education access, and global mobility, its primacy in early education has been linked to persistent learning difficulties, low literacy levels, and limited mastery of abstract and conceptual knowledge among primary school pupils (Ene & Offorma, 2013; Bamgbose, 2011). These persistent challenges have catalyzed renewed scholarly and policy interest in mother tongue–based multilingual education as a strategy to enhance educational quality, equity, and inclusion (Benson, 2004; UNESCO, 2003).

The National Policy on Education (Federal Republic of Nigeria, 2013) recommends the use of the mother tongue or language of the immediate environment as the medium of instruction in the foundational years of schooling. This recommendation is supported by cognitive and sociolinguistic theories emphasizing that instruction in a familiar language facilitates comprehension, strengthens metalinguistic awareness, and promotes smoother acquisition of additional languages (Cummins, 2000; Skutnabb-Kangas, 2000). Empirical studies demonstrate that learners taught in their first language exhibit stronger literacy skills, higher self-confidence, and better academic outcomes across subjects (Bamgbose, 2011; May, 2012). Despite these documented benefits, implementation in Nigerian classrooms remains uneven. English continues to dominate instruction due to societal attitudes that equate English proficiency with socio-economic mobility, examination-oriented education that privileges English-medium assessments, and globalising forces that valorise English as a language of prestige (Ene & Offorma, 2013; Obanya, 2004).

The persistence of English-dominated instruction reflects both structural and cultural barriers to effective mother tongue education. On the structural side, textbooks, teaching materials, assessment instruments, and educational resources are overwhelmingly oriented toward English (Bamgbose, 2011). Culturally, teachers' proficiency, pedagogical practices, and perceptions of parental expectations often undermine the use of indigenous languages in classrooms (Adegbija, 2004). These intersecting barriers constrain the potential of mother tongue education, limit inclusive, learner-centered pedagogy, and inhibit equitable learning outcomes.

Against this backdrop, this article revisits the debate on language of instruction and academic achievement in Nigeria, situating it within broader international, comparative, and cognitive perspectives. The study aims to strengthen the case for mother tongue–based multilingual education through a holistic, evidence-informed approach. Specifically, it seeks to: (i) clarify key concepts and theoretical frameworks underpinning language of instruction policies; (ii) examine cognitive, sociolinguistic, and educational theories relevant to language learning and literacy development; (iii) review empirical evidence from Nigeria and other multilingual contexts to illustrate the impact of language choice on learning outcomes; (iv) analyse policy, sociocultural, and implementation challenges; and (v) propose a pragmatic, context-sensitive framework for integrating mother tongue instruction into early primary education, aligned with international best practices and sustainable multilingual education strategies (Benson, 2004; Cummins, 2000; UNESCO, 2003).

By foregrounding cognitive, cultural, and policy dimensions, this article contributes to ongoing debates on equitable and effective education in multilingual societies. It underscores the centrality of mother tongue instruction not only as a pedagogical tool but also as a vehicle for cultural preservation, social justice, and the realization of inclusive learning opportunities for all learners in linguistically diverse societies like Nigeria (Skutnabb-Kangas, 2000; May, 2012).

Language of Instruction

The language of instruction refers to the language systematically employed by teachers for teaching, explaining concepts, managing classroom interaction, and assessing learners' understanding. It also encompasses the language through which learners engage with textbooks, instructional materials, examinations, and other learning resources (Bamgbose, 2011; May, 2012). In multilingual contexts, the choice of instructional language is not merely a logistical or administrative decision; it has profound cognitive, pedagogical, and socio-cultural consequences. When the language of instruction diverges from learners' home language, significant barriers may emerge, including reduced comprehension, limited conceptual understanding, decreased participation, lower literacy outcomes, and diminished motivation (Cummins, 2000; Benson, 2004). Cognitive load theory suggests that learners exposed to instruction in an unfamiliar language experience increased processing

demand, which can inhibit knowledge acquisition and critical thinking (Sweller, 2011).

Mother Tongue and Language of the Immediate Environment

The term mother tongue is generally defined as the first language acquired at home and the language in which a child demonstrates the greatest linguistic and cognitive proficiency (Skutnabb-Kangas, 2000). In linguistically heterogeneous communities, the language of the immediate environment often denotes a dominant local language understood by most learners within a specific school or community (Adegbija, 2004). Mother tongue–based education, particularly in early schooling, leverages learners' familiar linguistic repertoire to enhance comprehension, facilitate literacy acquisition, promote cognitive development, and bolster confidence and classroom participation (Benson, 2004; UNESCO, 2003). Research also indicates that a strong foundation in the mother tongue enables smoother and more effective acquisition of additional languages, as learners can transfer cognitive and metalinguistic skills from their first language to second or third languages (Cummins, 2000; Bamgbose, 2011).

Academic Achievement

Academic achievement refers to the demonstrable performance of learners in school subjects, assessed through examinations, tests, continuous assessments, and other indicators of cognitive and practical competencies (May, 2012). Beyond quantitative measures such as grades or scores, academic achievement encompasses learners' depth of understanding, critical thinking, problem-solving abilities, and capacity to apply knowledge across contexts (Cummins, 2000). Evidence consistently demonstrates that alignment between language of instruction and learners' linguistic proficiency significantly enhances academic outcomes. Instruction delivered in a language learners comprehend fully facilitates meaningful engagement with curriculum content, supports higher-order thinking, and promotes transferable cognitive skills, thereby improving overall academic performance and contributing to educational equity (Bamgbose, 2011; May, 2012; UNESCO, 2003).

Evolution of Language-in-Education Policy in Nigeria

Nigeria's language-in-education policy has undergone profound transformations, reflecting historical, sociopolitical, and educational shifts from the colonial era to the present day. During colonial rule, English was imposed as the sole language of administration, governance, and formal education, while indigenous languages were largely confined to informal and domestic domains (Adegbija, 2004; Bamgbose, 2011). This policy entrenched English as the language of social mobility, official communication, and intellectual advancement, creating a linguistic hierarchy that privileged colonial language acquisition over local linguistic knowledge. Indigenous languages were often undervalued, and their use in education was minimal, limited

to oral instruction, translation of religious texts, or basic literacy programs in local languages (Obanya, 2004).

Following Nigeria's independence in 1960, policy reformers increasingly recognized the educational, cognitive, and cultural value of Nigerian languages. Subsequent policy pronouncements, including the first National Policy on Education (1977) and subsequent revisions, endorsed the use of mother tongue or the language of the immediate environment as the medium of instruction in early primary education (Federal Republic of Nigeria, 2013). These reforms were informed by research demonstrating that learners comprehend and retain information more effectively when taught in a familiar language, and that mother tongue instruction facilitates the development of literacy, cognitive skills, and metalinguistic awareness (Cummins, 2000; Benson, 2004).

The National Policy on Education explicitly supports mother tongue instruction at the lower primary level, emphasizing the role of indigenous languages in fostering comprehension, promoting cultural identity, and providing a foundation for second language acquisition (FRN, 2013; UNESCO, 2003). Despite these policy provisions, implementation has been inconsistent and, in many cases, largely symbolic. English continues to dominate classroom instruction—even in early childhood settings—due to several interrelated factors: limited political commitment and policy monitoring, scarcity of teaching and learning resources in indigenous languages, parental and societal preference for English, and the prevailing examination-oriented culture that prioritizes English-medium assessments (Bamgbose, 2011; Ene & Offorma, 2013).

This persistent policy–practice gap remains a major impediment to educational effectiveness in Nigeria. The disjunction between official policy and classroom realities undermines the potential benefits of mother tongue education, restricts meaningful learner engagement, and perpetuates inequities in literacy and academic achievement. Moreover, it highlights the enduring influence of historical colonial legacies on contemporary education, where language choice continues to reflect broader social, economic, and political hierarchies (Adegbija, 2004; Obanya, 2004).

In sum, while Nigeria's language-in-education policies demonstrate a clear recognition of the value of mother tongue instruction, translating these policies into effective classroom practice remains a formidable challenge. Addressing this gap requires sustained policy enforcement, investment in indigenous language resources, teacher training, and community sensitization to align educational practices with the goals of equitable and inclusive multilingual education (May, 2012; Skutnabb-Kangas, 2000).

Language of Instruction and Academic Achievement: Empirical Evidence

Evidence from Nigerian Studies

A substantial body of empirical research from Nigeria demonstrates that learners instructed in their mother tongue or the language of the immediate environment consistently exhibit superior academic outcomes compared to peers taught exclusively in English, particularly in literacy, numeracy, and foundational science subjects (Bamgbose, 2011; Adegbija, 2004). Mother tongue instruction enhances comprehension, facilitates cognitive processing, and encourages active classroom participation, allowing learners to engage meaningfully with curricular content (Ene & Offorma, 2013). Studies have also documented that pupils receiving instruction in familiar languages exhibit lower dropout rates, higher retention of knowledge, and stronger conceptual understanding, suggesting that mother tongue instruction serves as a robust foundation for lifelong learning (Benson, 2004; Obanya, 2004).

Despite these advantages, Nigerian research highlights persistent systemic and contextual challenges that limit the full realisation of mother tongue–based instruction. Key barriers include the limited availability of textbooks, teaching aids, and digital learning materials in indigenous languages; insufficient teacher training and professional development in local language pedagogy; and societal perceptions that equate English proficiency with intelligence, prestige, and socioeconomic advancement (Bamgbose, 2011; May, 2012). These challenges reinforce the entrenched dominance of English in classroom practice and contribute to a policy–practice gap, whereby the stated objectives of mother tongue education in national policy are not fully translated into effective classroom implementation.

Evidence from Other Multilingual Contexts

Comparative research from multilingual contexts worldwide further corroborates the educational benefits of mother tongue–based instruction. In countries such as Ethiopia, Tanzania, and Malawi, learners who receive initial schooling in their first language demonstrate higher literacy and numeracy achievement, better conceptual understanding, and greater classroom engagement than peers instructed in second languages from the outset (Heugh, 2011; UNESCO, 2003). Moreover, evidence from the Philippines indicates that learners instructed in their mother tongue transition more successfully to second-language instruction, acquiring additional languages with higher proficiency and confidence (Benson, 2004). Scandinavian countries also provide illustrative cases where early education in a child's first language, combined with structured second-language support, promotes both academic success and multilingual competence (May, 2012).

These findings collectively underscore the global relevance of mother tongue education as an evidence-based strategy for improving learning outcomes, promoting equity, and facilitating multilingual competence. They further highlight that, while

contextual factors such as teacher preparedness, instructional materials, and sociocultural attitudes influence outcomes, the cognitive and pedagogical benefits of first-language instruction are robust across diverse multilingual settings (Cummins, 2000; Skutnabb-Kangas, 2000). For Nigeria, these international examples reinforce the imperative to strengthen mother tongue instruction as part of a sustainable, inclusive, and evidence-informed language-in-education policy framework.

English as the Dominant Language of Instruction: A Critical Appraisal

Functional and Instrumental Value of English

English occupies a central position in Nigeria's educational, social, and economic landscape. As the official language of administration, governance, and formal education, it serves as a vital instrument for national unity, interethnic communication, access to higher education, and global engagement (Adegbija, 2004; Bamgbose, 2011). Proficiency in English is widely regarded as a prerequisite for academic progression, professional advancement, and participation in international and digital economies. Consequently, both parents and educational institutions often exhibit a strong preference for English-medium instruction, perceiving it as a gateway to social mobility, prestige, and global competitiveness (May, 2012; Obanya, 2004). This instrumental value, coupled with societal perceptions, underpins the dominance of English in Nigerian classrooms from the earliest stages of formal education.

Pedagogical Limitations of Early English-Medium Instruction

Despite its functional advantages, early and exclusive reliance on English as the language of instruction poses significant pedagogical challenges. Many Nigerian children commence schooling with minimal exposure to English in their home and community environments, resulting in a mismatch between learners' linguistic repertoire and classroom expectations (Bamgbose, 2011; Cummins, 2000). This linguistic gap often manifests as rote learning, superficial memorization, and limited participation in classroom interactions, which undermine meaningful learning and inhibit the development of critical thinking, problem-solving skills, and conceptual understanding (Ene & Offorma, 2013; Skutnabb-Kangas, 2000). Empirical studies consistently indicate that early English-medium instruction, without sufficient scaffolding or mother tongue support, contributes to low literacy rates, poor academic performance, and increased learner frustration, particularly in foundational subjects such as literacy, numeracy, and basic science (Bamgbose, 2011; UNESCO, 2003).

Constraints to Effective Mother Tongue Education in Nigeria

The implementation of mother tongue or language-of-the-immediate-environment instruction in Nigeria is constrained by a combination of structural, pedagogical, and

sociocultural factors. These constraints operate at multiple levels, from policy formulation to classroom practice, and collectively limit the effectiveness of indigenous language education:

1. **Extreme Linguistic Diversity**: Nigeria's remarkable linguistic heterogeneity, comprising over 500 languages, complicates the selection, standardization, and curriculum development for mother tongue instruction (Adegbija, 2004; May, 2012). Decisions regarding which local language to use in multilingual classrooms often involve difficult trade-offs and can inadvertently marginalise less dominant languages.

2. **Inadequate Instructional Materials**: The shortage of textbooks, teaching aids, and digital learning resources in indigenous languages severely limits effective classroom practice. This scarcity hampers the design of comprehensive curricula and constrains teachers' ability to provide engaging, culturally relevant instruction (Bamgbose, 2011; Ene & Offorma, 2013).

3. **Teacher Capacity**: Many educators lack formal training in bilingual or multilingual pedagogy and are not adequately equipped to deliver instruction in indigenous languages. Limited professional development opportunities reduce teachers' confidence and effectiveness, undermining policy intentions (Skutnabb-Kangas, 2000; Benson, 2004).

4. **Negative Language Attitudes**: Societal and institutional attitudes often portray indigenous languages as inferior, less prestigious, or unsuitable for formal education, creating resistance among parents, learners, and even educators. Such perceptions influence language choice in classrooms and contribute to the continued privileging of English (Obanya, 2004; May, 2012).

5. **Weak Policy Enforcement**: While national policy officially endorses mother tongue instruction at the lower primary level, enforcement remains inconsistent. Lack of sustained political will, inadequate monitoring mechanisms, and insufficient resource allocation result in a persistent gap between policy intentions and classroom practice (FRN, 2013; Bamgbose, 2011).

Together, these interrelated constraints highlight that the challenges of mother tongue education are not purely pedagogical but structural, sociocultural, and political. Addressing them requires a coordinated approach that aligns policy directives, resource provision, teacher capacity development, and community engagement with the overarching goal of equitable, effective, and inclusive multilingual education.

Towards a Strengthened Multilingual Education Framework

Building on the analysis of language-in-education policy, instructional outcomes, and empirical evidence, this paper advocates for a pragmatic multilingual education model that transcends the traditional binary between English and mother tongue. Such a framework prioritises both cognitive development and socio-cultural inclusion, recognising that learners' linguistic repertoires are resources rather than obstacles (Cummins, 2000; May, 2012). The core components of a strengthened multilingual education framework for Nigeria include:

Sustained Use of Mother Tongue in Early and Middle Primary Education:

Learners should receive instruction in their mother tongue or the language of the immediate environment throughout the foundational years. Consistent use of familiar languages enhances comprehension, strengthens conceptual understanding, fosters literacy acquisition, and builds cognitive skills that can later be transferred to additional languages (Benson, 2004; Skutnabb-Kangas, 2000).

Systematic and Gradual Introduction of English

English should initially be introduced as a subject, followed by a carefully phased co-medium approach in later grades. This strategy allows learners to consolidate foundational knowledge in a language they understand fully, reducing cognitive overload while preparing them for functional bilingualism and global engagement (Cummins, 2000; UNESCO, 2003).

Development of Standardized Orthographies and High-Quality Instructional Materials

To address structural constraints, the creation of standardized orthographies, textbooks, digital resources, and culturally relevant learning aids in major Nigerian languages is essential. Such resources provide teachers and learners with the tools necessary for effective mother tongue instruction and promote the sustainability of indigenous languages (Bamgbose, 2011; Ene & Offorma, 2013).

Comprehensive Teacher Education in Multilingual Pedagogy

Teacher preparation programs must equip educators with skills in bilingual and multilingual pedagogy, inclusive classroom management, and culturally responsive instructional design. Continuous professional development ensures that teachers can implement mother tongue–based strategies effectively and adapt to diverse linguistic contexts (Benson, 2004; Skutnabb-Kangas, 2000).

Public Sensitization and Attitudinal Change

Sustainable multilingual education requires active engagement with parents, communities, and policymakers to challenge negative perceptions of indigenous

languages. Public awareness campaigns and advocacy initiatives can promote the value of mother tongue instruction, positioning it as a means of cognitive development, cultural preservation, and social empowerment rather than a barrier to advancement (Obanya, 2004; May, 2012). By integrating these elements, a strengthened multilingual education framework aligns pedagogical practice with cognitive, sociolinguistic, and policy imperatives, ensuring that learners achieve both academic success and linguistic competence.

Implications for Educational Policy and Practice

Adoption of a robust mother tongue–based multilingual education framework carries profound implications for policy, pedagogy, and sustainable national development.

1. **Educational Equity**
   Prioritizing mother tongue instruction ensures that all learners, regardless of socioeconomic background, have equitable access to comprehension, critical thinking development, and meaningful participation in school. Aligning instructional language with learners' linguistic proficiency mitigates early learning disadvantages and narrows achievement gaps (Benson, 2004; Cummins, 2000).

2. **National Integration and Cultural Sustainability**
   By validating indigenous languages in formal education, policymakers can foster cultural pride, social cohesion, and interethnic understanding. Mother tongue instruction reinforces learners' connection to their cultural heritage while supporting national unity in a multilingual society (Adegbija, 2004; May, 2012).

3. **Pedagogical Transformation**
   Educators are encouraged to adopt learner-centered, language-sensitive instructional strategies that leverage learners' existing linguistic repertoires. This approach promotes active engagement, problem-solving, and critical thinking, moving beyond rote memorization associated with early English-only instruction (Ene & Offorma, 2013; Skutnabb-Kangas, 2000).

4. **Investment in Research, Curriculum, and Teacher Development**
   Implementation of a multilingual education framework requires sustained investment in the development of curricula, high-quality instructional materials, and teacher training programs. Evidence-based policy formulation, regular monitoring, and continuous assessment are critical for ensuring effective classroom practices and systemic accountability (Bamgbose, 2011; UNESCO, 2003).

5. **Sustainable Development Goals (SDGs) Alignment**
   Strengthening mother tongue–based multilingual education contributes to the attainment of several SDGs, including quality education (SDG 4), reduced inequalities (SDG 10), and sustainable communities (SDG 11). By embedding linguistic inclusion within national education systems, Nigeria can promote social equity, cultural sustainability, and economic participation across diverse populations (May, 2012; UNESCO, 2021).

In conclusion, the adoption of a pragmatic multilingual education framework transforms the language of instruction from a source of cognitive and social exclusion into a vehicle for equity, cultural preservation, and educational excellence. Policymakers, educators, and communities must collaborate to ensure that Nigeria's linguistic diversity becomes an educational asset rather than a barrier, thereby fostering inclusive, learner-centered, and sustainable educational outcomes.

Conclusion

The debate on language of instruction and academic achievement in Nigeria remains central to broader concerns about educational quality, equity, and national development. A substantial body of research, drawing on learning theory, language acquisition studies, and empirical evidence from Nigeria and other multilingual contexts, consistently demonstrates that mother tongue–based instruction enhances comprehension, classroom participation, and overall academic achievement, particularly in the foundational years of schooling (Bamgbose, 2011; Cummins, 2000; Skutnabb-Kangas, 2000). Learners instructed in their first language develop stronger literacy skills, higher self-efficacy, and more robust conceptual understanding, which in turn facilitate the later acquisition of additional languages, including English.

While English retains undeniable importance as the language of higher education, national administration, and international engagement, its early and exclusive use as the medium of instruction often creates cognitive and pedagogical challenges. Premature dominance of English in early schooling can result in superficial learning, reduced learner participation, and inequitable educational outcomes, particularly for children with limited exposure to English at home (Benson, 2004; Ene & Offorma, 2013).

This article has advocated for a shift away from polarized debates toward a balanced, evidence-based multilingual education framework that recognises the complementary roles of indigenous languages and English. Such a framework emphasizes sustained use of mother tongue in the early and middle years, systematic introduction of English, investment in standardized instructional materials, comprehensive teacher education, and public sensitization to elevate societal attitudes toward local languages (May, 2012; UNESCO, 2003).

For Nigeria, translating policy commitments into effective classroom practice requires sustained political will, robust resource allocation, professional development for educators, and collaborative engagement with communities. Implementing this multilingual approach not only enhances academic achievement but also supports cultural preservation, social cohesion, and inclusive access to education, contributing directly to national development and the realization of global education goals (FRN, 2013; Obanya, 2004; UNESCO, 2021).

From an international perspective, the Nigerian experience underscores the broader relevance of mother tongue–based multilingual education as a viable strategy for improving learning outcomes in linguistically diverse contexts. Repositioning language of instruction at the center of educational reform is therefore both a pedagogical and policy imperative, ensuring that learners can fully access knowledge, participate meaningfully in learning, and develop the linguistic competencies necessary to thrive in a multilingual, globalized world (Olatunji & Eyisi, 2023).

Recommendations

Building on the analysis of Nigeria's language-in-education policies, empirical evidence on academic achievement, and international perspectives on multilingual education, this paper proposes a set of actionable recommendations to strengthen mother tongue–based multilingual education and ensure equitable learning outcomes.

1. Inclusive and forward-looking policies are central to integrating indigenous languages into formal education. The Nigerian government should strengthen the implementation of the National Policy on Education by mandating the use of mother tongue or language of the immediate environment in the foundational years of primary schooling. Regulatory frameworks should incentiviSe the production of teaching and learning materials in indigenous languages, including textbooks, digital content, and assessment tools. Moreover, mechanisms must be established to monitor and evaluate policy implementation across states and local education authorities to ensure consistency and accountability. Embedding these measures within national legislation and educational policy will move Nigeria from rhetorical support to concrete, enforceable action.

2. Effective mother tongue instruction depends on the availability of high-quality resources and linguistic data. Governments, in partnership with private sector actors and academic institutions, should fund the creation and dissemination of standardized orthographies, textbooks, digital resources, and culturally relevant learning aids in major Nigerian languages (Ene & Offorma, 2013; UNESCO, 2003). The development of parallel corpora, lexicons, and audio-visual databases is also essential to support literacy

development, teacher training, and future language technology initiatives (Skutnabb-Kangas, 2000; Benson, 2004). Public–private partnerships and collaborations with universities, cultural organizations, and NGOs can further pool expertise and resources to ensure sustainability and broad access to these materials (Bamgbose, 2011).

3. Teachers play a critical role in implementing multilingual education effectively. Pre-service and in-service teacher education programs must integrate training in bilingual and multilingual pedagogy, culturally responsive teaching, and effective classroom management in linguistically diverse contexts (Cummins, 2000; Benson, 2004). Continuous professional development opportunities, mentorship, and support networks can help teachers share best practices, adopt innovative instructional strategies, and respond to the specific linguistic needs of their learners (May, 2012). Strengthening teacher capacity ensures that policy intentions are translated into meaningful classroom practice (Olatunji, 2020).

4. The success of mother tongue instruction depends on positive societal attitudes toward indigenous languages. Public awareness campaigns should emphasize the cognitive, cultural, and academic benefits of mother tongue–based education (Obanya, 2004; Olatunji, 2025). Parents, community leaders, and local organizations should be engaged as active partners in curriculum development, school governance, and advocacy for indigenous language instruction (Ene & Offorma, 2013; Olatunji, 2026). Civil society and media platforms can promote indigenous languages as valuable assets, fostering societal recognition and ownership of multilingual education initiatives (Bamgbose, 2011).

5. A pragmatic multilingual education framework should recognize the complementary roles of indigenous languages and English. Mother tongue instruction should be sustained throughout the early years, while English is systematically introduced first as a subject and later as a co-medium of instruction. Curricula should leverage learners' first language for conceptual understanding, while scaffolding English proficiency to promote functional bilingualism. Assessment strategies must reflect multilingual instruction, ensuring that learners' cognitive and academic progress is accurately measured without privileging English at the expense of comprehension and critical thinking (Oludare. & Olatunji, 2024).

6. Sustained research and innovation are critical to overcoming structural and pedagogical barriers. Policymakers and institutions should fund empirical studies examining pedagogical approaches, learning outcomes, and language acquisition in multilingual classrooms. Support for innovative instructional technologies, digital learning platforms, and AI-driven language tools that

accommodate low-resource languages will further enhance learning opportunities. Interdisciplinary research networks involving linguists, educators, policymakers, and technologists can facilitate the development of context-specific solutions for multilingual education.

7. Implementing these recommendations requires coordinated, multi-stakeholder action, linking policy, pedagogy, research, and community engagement. When executed systematically, they can transform mother tongue–based multilingual education from a marginalised policy aspiration into a central pillar of Nigeria's education system. By foregrounding linguistic diversity, equitable access, and learner-centered instruction, Nigeria can foster educational inclusion, cultural preservation, and sustainable national development, ensuring that learners are equipped with both the linguistic competence and cognitive skills necessary for success in local and global contexts.

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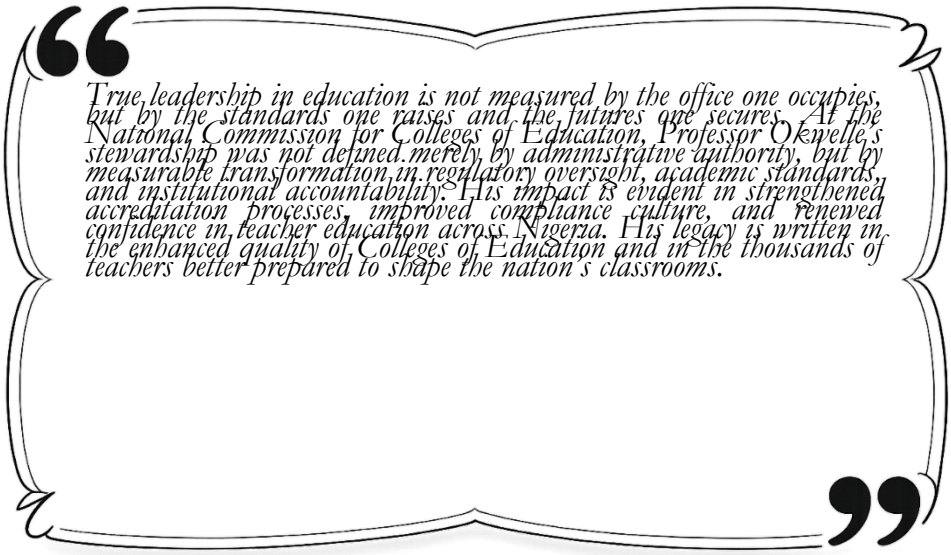
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Chapter 5

Code-Switching In English Grammar Classrooms: Teachers' Perception

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Oyo, Oyo State.

Abstract

This study investigated code-switching in English grammar classrooms: Teachers' perception. It adopted the survey research design. Twenty senior secondary schools were randomly selected from public senior secondary schools in Oyo West Local Government Area of Oyo State. Simple random sampling technique was used to select two teachers from each school making a total of 40 teachers of English Language. In all, a total number of 40 teachers of English Language participated in the study. One research instrument was used for data collection: Questionnaire on Teachers' Perception of Code-Switching in English Grammar Classroom (r=0.76). Data collected were analysed using descriptive statistics of frequency count, percentage scores, mean, standard deviation and inferential statistics of t-test at 0.05 level of significance. Findings of the study revealed that teachers' perception of code-switching in English grammar classrooms is very positive (WA= 3.21). Also, there was no significant difference between male and female teachers' perception of code-switching in English grammar classroom (t = -0.96; df = 38; P>0.05). Based on the findings of this study, it was recommended that Teachers should have knowledge of English grammar so as to give quality knowledge to students in this area. Education Policy should be reviewed in a way that teachers are allowed to code-switch to students' first language during teaching irrespective of students' educational level or class. Government and Employers should put all the necessary things in place to expose English language teachers to seminars and workshops so as to improve their knowledge of English grammar.

Keywords: *Code-switching, English Grammar, Teachers' Perception*

Introduction

Grammar is crucial for communication to take place because it shows how language is used. Communication suffers a considerable breakdown in the absence of correct use of grammar. It is an aspect of language that is crucial and central to language learning and acquisition. It is the study of the systematic account of the rules of sentence structure, syntax and semantics of a particular language. Writing process involves the compilation of texts as well as orthography and grammar. The right meaning of words, grammatically correct spelling and correct syntax and grammar contradictions must be acquired in order to attain a good penmanship and by extension to be a good speaker. Hammer (2001) defined English grammar as the description of the way in which words can change their forms and be combined into sentences in the language. It is also defined by Lado (1977) as the study of rules that are claimed to tell the social what should and should not say in order to speak language of the educated class. Grammar is seen as a fundamental part of a language. When students are exposed to grammar, they are indirectly taught the use of language. Previous studies showed that teaching of grammar is important for L2 learner in enhancing their language learning (Thornbury, 1999).

According to Richards and Schmidt (2010) grammar is a description of the structure of a language and how language units such as words and phrases are formed into sentences. Tomori (1977) points out that grammar is first seen as the quality of the knowledge of a language possessed by a speaker, as inferred from the nature of his utterance. Chomsky (1965) noted that grammar is a description of the ideal speaker-hearer's intrinsic competence. Grammar is asking a system of rules governing the use of words at their different forms in a language. It is pertinent to state here that a good mastery of any language is based on the spoken and written form. These aspects that are spoken and written are aided by the adequate knowledge of the grammar of the language. Students who lack proficiency in English language especially in the grammar aspect are at a decided disadvantage in school.

Alaneme (2005) laments the mass failure recorded annually by students in English and concluded that the poor performance of students in English language examinations conducted by the West African Examinations Council (WAEC) and National Examinations Council (NECO) is actually a true reflection of the low standard of education in Nigeria. The poor performance of students in English language was reaffirmed by WAEC Chief Examiners' Reports as evident in the analysis of West African Senior School Certificate Examination results from 2000-2012. Contrary to this, Ohuche (1992) points out that despite all the changes introduced in English language curriculum for senior secondary schools, the performance of students does not improve, students have continued to perform poorly in the language.

Ohuche (1992) stresses that the greatest shortcomings of these students are their inability to express idea correctly in English using the correct grammar. When these students gain admission into tertiary institution, many of them do not gain much from what their lecturer teach. WAEC Chief Examiners' Report (2015) confirmed that candidates' weaknesses include inability to marshal their points and answers to questions that required detailed explanations, inability to spell technical words correctly, inability to understand the words used in passages due to low level of vocabulary knowledge and ignorance of the rudiments of English grammar. Also, Adesulu and Laju (2015) attributed the weaknesses of candidates to inadequate preparation and rote memorisation, illegible handwriting and vague or irrelevant answers.

As a way of addressing this problem, scholars have carried out studies on methods and strategies of teaching English grammar. Studies on student and teacher related factors in relation with English grammar have also been carried out. All these studies came up with good contributions to the teaching and learning of English grammar in secondary schools but with less research focus on teachers' perception of code-switching in English grammar classrooms.

Code switching is the alternate use of two or more languages in the same utterance or conversation (Milroy and Muysken, 1995). As the diversity of language causes the acquisition of more than one language and the mixing of codes in usage, second language acquisition must involve the active integrated role of the local languages (Canagarajah, 1999). Codeswitching is the mixing by bilinguals or multilinguals of two more languages in discourse, often with no change of interlocutor or topic. It is the alternating use of two or more languages in teaching and learning for easy acquisition of knowledge by learners (Poplack, 2001).

Adegbite and Akindele (2005) describe code-switching as means of communication which involves a speaker alternating between one language and the other in communicating events. Coupland and Jaworski (1997) note that code-switching is the use of two or more languages in the same conversation or utterance. It refers to all cases where lexical items and grammatical features from two languages appear in one sentence. Code-switching has positive effects on learners and teachers (Ahmad, 2009; Promnath, 2016). Clegg (1995) notes that code switching is the style of short-term alternation between languages. That is a situation whereby markets women switch into an alternate language for a short stretch of talk and switch back. De Klerk (2006) asserts that code switching is the use of more than one variety of language in the same conversation. Also, Moodley (2010) defines code switching as the alternate use of two (or more) linguistic varieties (languages, dialects, registers of the same language) at the inter sentential level, i.e. at word, sentence boundaries.

Code-switching is a linguistic behaviour that arises as a result of languages coming into contact with each other and the need for individuals to effectively communicate.

Generally, it simply means mixing of words, phrases or smaller units of one language into the structure of another language in other to effectively communicate. Hymes (1964) asserts that code-switching is a common term for alternative use of two or more languages, varieties of a language or even speech styles. Code-switching which is often times referred to as 'code-mixing', 'code-shifting' or 'code-changing' has also been defined as the act of alternation of two languages within a single discourse, sentence or constituent" (Poplack, 2001; Olatunji & Ayegboyin, 2020). Bhatia and Ritchie (2013) note that code alternation is the mixing of various linguistic units (morphemes, words, modifiers, phrases, clauses and sentences) primarily from two participating grammatical systems within a sentence.

According to Ahmad (2009), code-switching provides students with opportunities to communicate and enhance their understanding. Furthermore, it is time effective because teachers do not waste time to explain or search simple words to simplify any confusion that arises. The use of code-switching helps students with lower performance to be able to follow the lessons better than using English only. It reduced students' stress by not worrying about what to say because they could switch to their mother tongue when they didn't have an idea of how to say it in English. In addition, switching to mother tongue helped to effectively manage classrooms and incorporate morality and ethics (Promnath, 2016).

According to Domalewska (2015), when Code-switching is used, it is based on the processes of assimilation, developing meaningful cognitive sets (i.e. forming logical connection and organisation in the material), and using advanced organisers (i.e. general concepts that help the leaner to organise and understand new material). Meaningful leaning allows the information to be retained for a longer period of time; the information may be retrieved faster; furthermore, the student's cognitive structure is developed.

Statement of the problem

Grammar is crucial for communication to take place because it shows how language is used. Communication suffers a considerable breakdown in the absence of correct use of grammar. It is an aspect of language that is crucial and central to language learning and acquisition. However, reports have shown that students' performance in English grammar is very low. As a way of addressing the problem, researchers have carried out studies on different methods and strategies of teaching English grammar in schools. Despite the contribution of these studies to the teaching and learning of English grammar, the problem of students' poor performance in this aspect of the English language still persists. Studies have shown that code-switching has become a common feature of conversational discourse among Yoruba/English bilingual not excepting senior secondary students. Several studies have been carried out on incidence of code-switching both locally and internationally. However, few of these studies examined the teachers' perception of code-switching in English grammar

classroom. Therefore, this study investigated teachers' perception of code-switching in English grammar classrooms.

Research Questions

The following questions guided the research:

1. What is the teachers' perception of code-switching in English grammar classroom?
2. What is the difference between male and female teachers' teachers' perception of code-switching in English grammar classroom?

Significance of the Study

The study is significant in many ways. It revealed teachers' perception of code-switching in English grammar classrooms thereby helping government to solve the problem of poor performance in English grammar. Educational stakeholders would benefit from this study because they would be guided on identifying a factor that could influence students' performance in English grammar. This study would guide teachers who are in constant search for improved performance in English language and English grammar on areas of professional development needs. Finally, the study would add to the pool of research on solution to the poor performance of students in English language and English grammar.

Methodology

This study adopted the survey research design. Twenty senior secondary schools were randomly selected from public senior secondary schools in Oyo West Local Government Area of Oyo State. Simple random sampling technique was used to select two teachers from each school making a total of 40 teachers of English Language. In all, a total number of 40 teachers of English Language participated in the study. One research instrument was used for data collection: Questionnaire on Teachers' Perception of Code-Switching in English Grammar Classroom (r=0.76). Data collected were analysed using descriptive statistics of frequency count, percentage scores, mean, standard deviation and inferential statistics of t-test at 0.05 level of significance.

Results

Research Question 1: What is the teachers' perception of code-switching in English grammar classroom?

Table 1: Showing teachers' perception of code-switching in English grammar classroom

S/N	ITEMS	SA	A	D	SD	Mean	Std. D
1	Code-Switching in English grammar classroom is used to explain questions or statements that are incomprehensible to students	8(32)	32(8)	-	-	3.80	.405
2	Code-Switching in English grammar is used to correct students when they provide incorrect answers	10(25)	12(30)	10(25)	8(20)	2.60	1.081
3	Code-Switching in English grammar classroom is used to call on students to respond to class discussions.	20(50)	14(35)	5(12.5)	1(2.5)	3.33	.797
4	Code-Switching in English grammar classroom is used to facilitate students'	18(45)	19(47.5)	3(7.5)	-	3.38	.628

	understanding of English grammar.						
5	Code-Switching in English grammar classroom is used to enhance students' mastery of English grammar	31(77.5)	7(17.5)	1(2.5)	1(2.5)	3.70	.649
6	Code-Switching in English grammar classroom is used to test students' understanding of English grammar	6(15)	17(42.5)	10(25)	7(17.5)	2.55	.959
7	Code-Switching in English grammar classroom is used to highlight important points in English grammar	3(7.5)	11(27.5)	22(55)	4(10)	2.33	.764
8	Code-Switching in English grammar classroom is used to introduce the topic to be taught in English grammar	15(37.5)	21(52.5)	2(5)	2(5)	3.23	.768
9	Code-Switching in English grammar classroom is used to establish good	21(52.5)	7(17.5)	11(27.5)	1(2.5)	3.20	.939

	teacher-students relationship in English grammar classroom						
10	Code-Switching in English grammar classroom is used to maintain good classroom management in English grammar classroom	25(62.5)	12(30)	3(7.5)	-	3.55	.639
11	Code-Switching in English grammar classroom is used to increase students' participation in English grammar classroom	15(37.5)	22(55)	3(7.5)	-	3.30	.608
12	Code-Switching in English grammar classroom is used to explain English grammar thoroughly	22(55)	17(42.5)	1(2.5)	-	3.50	.641
13	Code-Switching in English grammar classroom avoids confusion in English grammar classroom	19(47.5)	15(37.5)	4(10)	2(5)	3.28	.847
14	Code-Switching in English grammar	15(37.5)	19(47.5)	3(7.5)	3(7.5)	3.15	.864

	classroom makes students ask questions where necessary						
15	Code-Switching in English grammar classroom is used to differentiate grammar of students' L1 and grammar of L2	18(45)	17(42)	4(10)	1(2.5)	3.30	.758
16	Code-Switching in English grammar classroom is used to simplify English grammar	8(20)	28(70)	3(7.5)	1(2.5)	3.08	.616
17	Code-Switching in English grammar classroom is used to make students construct knowledge by themselves	17(42.5)	17(42.5)	6(15)	-	3.28	.716
18	Code-Switching in English grammar classroom makes students transfer their knowledge of first language into the second language	22(55)	11(27)	6(15)	1(2)	3.35	.834
19	Code-Switching in English grammar classroom makes	16(40)	19(47)	5(12)	-	3.28	.679

	students to participate actively in class						
20	Code-Switching in English grammar classroom makes students to lose focus in the classroom	17(42.5)	9(22.5)	8(20)	86(15)	2.93	1.118
Weighted Average= 3.21							

Note: Percentage in Parenthesis

Table 1 reveals that teachers' perception of code-switching in English grammar classrooms is very positive (WA= 3.21). Analysis further shows that teachers perceive that Code-Switching in English grammar classroom is used to explain questions or statements that are incomprehensible to students (π=3.80). Code-Switching in English grammar is used to correct students when they provide incorrect answers (π=2.60). Code-Switching in English grammar classroom is used to call on students to respond to class discussions (π=3.33). Code-Switching in English grammar classroom is used to facilitate students' understanding of English grammar (π=3.38). Code-Switching in English grammar classroom is used to enhance students' mastery of English grammar (π=3.70). Code-Switching in English grammar classroom is used to test students' understanding of English grammar (π=2.55). Code-Switching in English grammar classroom is used to highlight important points in English grammar (π=3.32). Code-Switching in English grammar classroom is used to introduce the topic to be taught in English grammar (π=3.20). Code-Switching in English grammar classroom is used to establish good teacher-students relationship in English grammar classroom (π=3.58). Code-Switching in English grammar classroom is used to maintain good classroom management in English grammar classroom (π=3.30). Code-Switching in English grammar classroom is used to increase students' participation in English grammar classroom (π=3.50). Code-Switching in English grammar classroom is used to explain English grammar thoroughly (π=3.28). Code-Switching in English grammar classroom avoids confusion in English grammar classroom (π=3.26). Code-Switching in English grammar classroom makes students ask questions where necessary (π=3.30). Code-Switching in English grammar classroom is used to differentiate grammar of students' L1 and grammar of L2 (π=3.08). Code-Switching in English grammar classroom is used to simplify English grammar (π=3.28). Code-Switching in English grammar classroom is used to make students construct knowledge by themselves

(π=3.35). Code-Switching in English grammar classroom makes students transfer their knowledge of first language into the second language (π=3.28). Code-Switching in English grammar classroom makes students to lose focus in the classroom (π=2.93).

Research Question 2: What is the difference between male and female teachers' perception of code-switching in English grammar classroom?

Table 2: Showing t-test analysis of the difference between male and female teachers' perception of code-switching in English grammar classroom

Gender	N	Mean	Std.D	T	df	Sig.	Remark
Male	17	63.06	6.00	-0.962	38	0.342	Not Significant
Female	23	64.83	5.56				

Table 2 showed that there was no significant difference between male and female teachers' perception of code-switching in English grammar classroom (t = -0.96; df = 38; P>0.05). The table also showed that female (π=64.83) teachers had higher perception than male teachers (π=63.06).

Discussion of the Findings

Table I revealed that teachers' perception of code-switching in English grammar classrooms was very positive. In support of this finding, Race (2001) says code-switching encourages deep learning by students, which leads to improvement in students' performance. Also, Juwaah (2003) states that code-switching is an effective and efficient strategy that leads to high academic achievement of students.

Table II revealed that there was no significance difference between male and female teachers' perception of code-switching in English grammar classrooms. The difference between the perception of male and female teachers of code-switching in English grammar classroom is not large enough to say that teachers' perceptions of code-switching in English grammar classroom are related to gender. In this view, Tesnim Ounis (2017) from his study reported that there was no significant difference in senior secondary teachers' perception of code-switching in English grammar classroom. Both male and female teachers had favourable perceptions towards the role of code-switching in English grammar classroom.

Conclusion

The study has shown that English grammar could be enhanced by Code-Switching. Based on the finding, the study has provided a better understanding of teachers' perception of code-switching in English grammar classrooms in Oyo West Local Government Area of Oyo State.

Recommendations

Based on the findings, it is recommended that:

1. Teachers should have knowledge of English grammar so as to give quality knowledge to students in this area.
2. Education Policy should be reviewed in a way that teachers are allowed to code-switch to students' first language during teaching irrespective of students' educational level or class.
3. Teachers should maintain moderate level of code-switching during English grammar lessons.
4. Government and Employers should put all the necessary things in place to expose English language teachers to seminars and workshops so as to improve their knowledge of English grammar.
5. Teachers should enroll for higher degree in English language in order to upgrade their knowledge.

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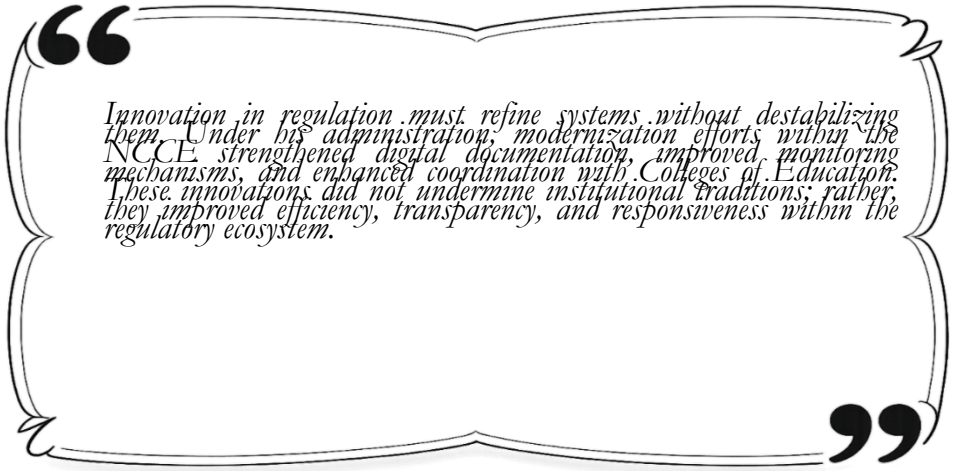
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Author's Biodata

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Chapter 6

Bridging The Gender Achievement Gap in Literacy: A Comparative Analysis of Task-Based and Conventional Writing Strategies

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Abstract

This study investigates the impact of the Task-Based Instructional Strategy (TBIS) on the academic performance of senior secondary school students in essay writing, with a focus on gender dynamics and learner engagement in the Enugu Education Zone, Nigeria. Utilising a quasi-experimental design, the research involves 650 Senior Secondary II students and compares the effectiveness of TBIS to traditional Lecture methods. Data are collected through pre-test and post-test assessments of students' essay writing skills, focusing on key dimensions such as content relevance, organisation, expression, and mechanical accuracy. The findings indicate that students taught using TBIS significantly outperformed their peers in the control group, demonstrating greater engagement and improved writing skills across both genders. Notably, the results reveal no significant difference in writing performance between male and female students in the TBIS group, suggesting that TBIS effectively mitigates traditional gender disparities in academic achievement. The Analysis of Covariance (ANCOVA) confirms that the method of instruction is a significant predictor of success, reinforcing the potential of TBIS as a universal teaching strategy. This research contributes to the existing literature on gender and educational methodologies by highlighting how task-based approaches can enhance student outcomes in literacy. The study underscores the importance of adopting innovative teaching strategies that foster collaboration and active learning, ultimately promoting equity in educational settings.

Keywords: *Task-Based Instruction, gender dynamics, learner engagement, essay writing, Nigeria*

Introduction

Literacy occupies a central position within the Nigerian secondary school curriculum, serving as the foundation for academic success, civic participation, and lifelong learning. Proficiency in reading and writing is not only essential for achievement across school subjects but also a key determinant of students' performance in high-stakes external examinations such as the West African Senior School Certificate Examination (WASSCE). Despite its importance, a persistent socio-cultural narrative frames language arts, particularly reading and writing, as a "feminine" domain (Wickes Jr., 2025). This perception, deeply embedded within societal expectations and classroom interactions, often discourages male students from fully engaging with literacy-related tasks, thereby contributing to observable gender gaps in writing achievement.

Research increasingly suggests that such disparities are not rooted in biological differences but are shaped by instructional practices, learner identity, and classroom culture (Ajayi, 2018; Francis & Skelton, 2019). Traditional approaches to writing instruction in Nigerian secondary schools frequently emphasise rote learning, rule memorisation, and examination-driven outcomes. These methods may inadvertently alienate male learners who often respond more positively to collaborative, purposeful, and action-oriented learning experiences (Okebukola, 2017). Consequently, disengagement among male students manifests in reduced motivation, limited participation, and weaker performance in written components of external examinations.

Task-Based Instruction (TBI) presents a promising pedagogical alternative capable of addressing these challenges. Rooted in communicative language teaching, TBI prioritises the meaningful completion of real-world tasks over the mechanical mastery of grammatical forms (Ellis, 2003; Nunan, 2004). By engaging learners in problem-solving, collaboration, and authentic language use, TBI creates an inclusive learning environment that values process, interaction, and purpose. Such an approach has been shown to enhance learner autonomy, motivation, and writing competence across diverse learner groups (Willis & Willis, 2007).

Importantly, TBI holds potential as a neutralising force in mitigating gender disparities in writing achievement. By shifting instructional focus away from abstract linguistic rules toward goal-oriented tasks, TBI reduces the influence of gendered stereotypes associated with language learning. Learners are assessed based on task completion, creativity, and communicative effectiveness rather than conformity to rigid linguistic norms, allowing both male and female students to participate on more equal footing (Carless, 2012). This study therefore moves beyond a narrow emphasis on achievement scores to interrogate the intersection of gender, learner engagement, and instructional methodology. In doing so, it provides a more nuanced

understanding of how pedagogical choices can either reinforce or challenge gender inequities within the Nigerian secondary school context.

Statement of the Problem

In Nigeria, proficiency in English remains a critical requirement for academic progression, effective participation in civic life, and access to socio-economic opportunities. As the official language of instruction and assessment, English plays a decisive role in students' success across all subjects at the secondary school level. Despite its importance, a significant proportion of Nigerian secondary school students continue to demonstrate weak writing competence, particularly in essay writing, which constitutes a substantial component of external examinations such as the West African Senior School Certificate Examination (WASSCE). Historical data from national examinations indicate a concerning trend of sub-par performance in English, specifically regarding credit-level attainment, with poor performance in essay writing identified as a major contributing factor. This underachievement has been linked largely to the continued reliance on traditional, teacher-centred instructional approaches that prioritise rote learning, grammatical drills, and examination rehearsal, often at the expense of learner interaction, creativity, and critical thinking. Such methods provide limited opportunities for students to engage collaboratively, apply language meaningfully, or develop confidence in expressing ideas through writing.

Moreover, socio-cultural perceptions that associate language arts with femininity have further complicated the problem by contributing to differential engagement and performance between male and female students. Male learners, in particular, are more likely to exhibit disengagement from writing tasks when instructional practices fail to accommodate diverse learning preferences or promote active participation. These gendered patterns of engagement suggest that the challenge of poor writing achievement is not solely pedagogical but also socio-cultural, necessitating instructional strategies that are inclusive and gender-responsive. Task-Based Instructional Strategy (TBIS), with its emphasis on cooperative learning, real-world tasks, and purposeful language use, offers a viable alternative to conventional writing instruction. By engaging learners collaboratively in meaningful tasks, TBIS has the potential to enhance motivation, improve writing competence, and mitigate gender disparities in achievement. However, despite growing global interest in task-based language teaching, empirical studies examining the effectiveness of TBIS on essay writing achievement within the Nigerian senior secondary school context, particularly from a gender perspective, remain limited. Against this backdrop, this study seeks to investigate the effect of cooperative learning through Task-Based Instructional Strategy on senior secondary school students' essay writing achievement, with specific attention to gender dynamics. Addressing this gap is

essential for informing instructional practice, improving WASSCE outcomes, and promoting equitable participation and achievement in English language classrooms.

Purpose of the Study

The purpose of this study was to investigate the effects of the Cooperative Learning Method, operationalised through Task-Based Instructional Strategy (TBIS), on students' achievement in English essay writing in in secondary schools within the Enugu Education Zone of Enugu State, Nigeria. Specifically, the study sought to:

1. determine the difference in mean achievement scores of students taught essay writing using the Cooperative Learning Method and those taught using the traditional Lecture Method;
2. examine the difference in mean achievement scores of male and female students taught essay writing using the Cooperative Learning Method; and
3. ascertain the interaction effect of teaching methods (Cooperative Learning Method versus Lecture Method) and gender on students' achievement in essay writing.

Research Questions

The study was guided by the following research questions:

1. What is the mean achievement score of students taught essay writing using the Cooperative Learning Method compared to those taught using the traditional Lecture Method?
2. What are the mean achievement scores of male and female students taught essay writing in English Language using the Cooperative Learning Method?
3. What are the interaction effects of the teaching methods (Cooperative Learning vs. Lecture Method) and gender on students' achievement mean scores in essay writing?

Hypotheses

The following hypotheses were formulated to guide the study:

1. **H01**: There is no significant difference in the mean achievement score of students taught essay writing using the Cooperative Learning Method compared to those taught using the traditional Lecture Method.

2. **H02**: There is no significant difference in the achievement mean scores of male and female students taught essay writing using the Cooperative Learning Method.

3. **H03**: There are no significant interaction effects of teaching methods (Cooperative Learning vs. Lecture Method) and gender on students' achievement mean scores in essay writing.

Theoretical Framework

Literature Synthesis

This study merges the Sociocultural and Cognitive-Interactionist viewpoints, following the integrative framework of Ellis et al. (2020), to explain how social interaction and mental processing drive literacy gains. Together, these perspectives provide a robust lens for understanding how Task-Based Instructional Strategy (TBIS) can enhance writing achievement while addressing gender-related disparities in learner engagement. This viewpoint posits that individuals engaged in learning employ their cognitive capabilities such as critical analysis, memory retention, and sustained attention to interpret new linguistic input and formulate novel replies. Central to this perspective is the role of interaction, particularly the negotiation of meaning, feedback, and opportunities for modified output, which facilitate deeper language processing and acquisition (Ellis et al., 2020). Within a TBIS framework, Learners engage in objective-oriented tasks that require intentional planning, the development of preliminary frameworks, and the later enhancement of their written work, thereby activating higher-order cognitive skills. Such cognitively demanding tasks promote meaningful engagement with language structures and discourse features, which are essential for effective essay writing.

Complementing this view, knowledge is constructed through collaborative social interactions and is supported by diverse educational tools, encompassing language systems, textual resources, and instructional strategies. Based on this theoretical lens, learning occurs through collaborative activities, scaffolding, and guided participation within a learner's Zone of Proximal Development (ZPD). TBIS aligns strongly with this perspective by encouraging peer interaction, cooperative problem-solving, and shared responsibility for task completion. These social processes enable learners to internalise linguistic forms and writing conventions through meaningful participation rather than passive reception.

By synthesising the Cognitive–Interactionist and Sociocultural perspectives, this study advances the position that TBIS offers a pedagogical bridge between individual cognitive engagement and socially mediated learning. The integration of mental processing and collaborative interaction provides an instructional environment in which diverse learners, regardless of gender, can participate actively and meaningfully. This theoretical alignment supports the assumption that well-designed tasks can reduce anxiety, enhance motivation, and promote equitable participation in writing activities.

Gender-Neutral Pedagogy

Within the context of gender and literacy, instructional methodology plays a crucial role in either reinforcing or challenging existing socio-cultural stereotypes. Traditional Presentation–Practice–Production (PPP) approaches to language teaching often emphasise accuracy, repetition, and teacher control, inadvertently rewarding passive compliance and rote reproduction of linguistic forms. Such learning behaviours have historically been associated with female socialisation in formal educational settings, potentially placing male learners at a motivational disadvantage (Dixon, 2020).

In contrast, Task-Based Instructional Strategy promotes learner autonomy, interaction, and purposeful communication. TBIS incorporates elements such as problem-solving, collaboration, competition, and the sharing of personal experiences; features that research has shown to enhance engagement among male learners without disadvantaging female learners (Gillies, 2016). By focusing on task completion and communicative effectiveness rather than rigid correctness, TBIS creates a more gender-neutral pedagogical space in which learners are evaluated based on contribution, creativity, and functional language use.

Consequently, this study conceptualises TBIS not merely as an instructional technique but as an inclusive pedagogical approach capable of mitigating gender disparities in writing achievement. Grounded in established theories of language learning and supported by empirical insights on gender-responsive pedagogy, the framework provides a strong theoretical justification for examining the impact of team-based instructional strategies on the literacy outcomes and composition skills of students at the senior secondary level.

Methodology

To investigate the causal link between TBIS and student outcomes, the study employed a non-equivalent control group strategy within a pre-test/post-test quasi-experimental framework to explore the causal relationships between the Task-Based Instructional Strategy (TBIS) and student achievement outcomes. This design was deliberately selected to ensure the examination could proceed without disrupting the established administrative framework of the schools involved. The target demographic comprised 2,119 Senior Secondary School II (SSII) students within the Enugu Education Zone in Enugu State, Nigeria. From this broader population, a sample of 650 students was strategically selected, which included 315 males and 335 females. To achieve a representative mix of urban and semi-urban students while ensuring gender parity, a dual-phase methodology was employed, characterized by the deliberate selection of four co-educational institutions and the subsequent utilisation of pre-existing classroom groups. Subsequently, cluster sampling was implemented; intact classes were designated to participate in the task-based

instructional framework, while the other classes served as a control group for comparative analysis. This methodological approach preserved the authentic classroom setting and mitigated the potential for the "Hawthorne Effect," which could arise if students modified their behavior due to awareness of being part of a research study.

The experimental group participated in a six-week TBIS program, emphasising collaborative writing tasks:

- **Creative Tasks**: Students collaborated on story-building exercises.
- **Collaborative Reporting:** Students worked in dyads to bridge informational voids, requiring verbal exchange to finalise shared reports, enhancing their writing skills through shared knowledge.
- **Problem-Solving**: Students drafted letters of complaint or proposals addressing community issues, encouraging meaningful writing.

The data concerning academic achievement were obtained from assessments conducted before and after the intervention, which were specifically designed to evaluate writing dimensions in accordance with the criteria established by the West African Examinations Council (WAEC).

Results

Comparative Achievement Data

The core of this study was to evaluate whether the implementation of TBIS helps harmonise the writing proficiency levels of both boys and girls. The pre-test scores indicated that female students initially had a slight advantage in writing mechanics (punctuation and spelling). However, following the TBIS intervention, the mean gain for both genders in the experimental group was nearly identical.

Table 1: Post-Test Achievement by Gender (TBIS Group)

Gender	N	Mean	Standard dev.
Male	315	63.85	5.21
Female	335	64.92	4.98

Results from the covariance analysis revealed that the instructional method emerged as the principal factor influencing student success, while the variable of learner gender did not demonstrate a statistically significant impact. Students in the TBIS group regardless of sex outperformed the control group by a margin of over 15%.

Interaction Effects

One of the most significant findings of this study was the Lack of Interaction Effect. In educational research, an interaction effect occurs when a teaching method works for one group (e.g., girls) but not the other (e.g., boys). The data confirm that TBIS serves as a "Universal Strategy" effective for all.

Discussion of Findings

In order to evaluate the effectiveness of task-oriented approaches, a study was conducted involving 650 senior secondary students. The results indicated that the instructional method employed was a major factor contributing to successful outcomes, as the group that received the intervention demonstrated significantly higher performance in post-test writing assessments when compared to the control group..

Superiority of TBIS over Conventional Methods

The evidence derived from this study support the assertions put forth by Ellis et al. (2020), suggesting that language proficiency improves when the learner's primary emphasis is directed towards meaning-making rather than the rote memorisation of grammatical structures. In the Enugu context, students taught via TBIS were required to complete real-world tasks (such as drafting community letters), which provided a functional purpose for their writing.

This outcome mirrors the recent findings of Abubakar and Muhammad (2025) in Niger State, who noted that Task-Based Language Teaching (TBLT) acts as an essential link, effectively integrating theoretical comprehension with practical application in communication. These findings provide additional support for the viewpoints articulated by Willis and Willis (2007), who contended that the "Task Cycle" (Task, Planning, and Report) provides the necessary scaffolding for complex linguistic output.

The Neutralisation of Gender Disparity

The findings indicated that the differences in performance based on sex were minimal within the treatment group. Although the study benefited from a robust statistical power derived from a sample of 650 students, the combined influence of the intervention and gender did not achieve statistical significance. This outcome implies that TBIS serves as an equitable instructional method.

This result is consistent with Ifeduba et al. (2022), whose study in Anambra State found that task-based learning acts as an equalizer, engaging both male and female students through collaborative problem-solving. By moving away from the "Presentation-Practice-Production" (PPP) model which often favors learners who are

comfortable with passive, repetitive tasks TBIS introduces a dynamic environment that appeals to the diverse learning styles of both genders.

Cognitive and Social Engagement

The tasks designed to facilitate informational bridging and the prompts requiring value judgments are employed to encourage students to engage in meaning negotiation and to articulate their perspectives. As noted by Nunan (2004), these tasks create a genuine need for communication. In our sample, the high-energy nature of the reporting phase encouraged students to polish their grammar not because of a teacher's prompt, but because they needed to be understood by their peers. As articulated in the recent academic compilation by Ahmadian and Long (2022) concerning Task-Based Language Teaching (TBLT), the framework posits that peer-feedback loop is crucial for developing the "accuracy" and "complexity" of student writing.

Recommendations

In light of the empirical findings and the extensive educational implications highlighted in this study, a series of actionable recommendations are put forth for stakeholders within the secondary education domain:

1. Educators must receive training in cooperative learning activities to enhance student collaboration and engagement, while also recognising the importance of gender dynamics in education.
2. Schools should invest in resources that enhance task-based activities, including collaborative technology for interactive learning.
3. Educational authorities should integrate Task-Based Instruction into the English curriculum to enhance writing skills and promote inclusivity. The instructional materials utilized in this study were structured to reflect the pedagogical guidelines advocated by the The Nigerian Educational Research and Development Council (NERDC**)**, ensuring that the TBIS framework complements current Nigerian educational policy.
4. Future studies should explore Task-Based Instruction's effects on various academic writing forms and its long-term impact on student outcomes.

Conclusion

In conclusion, this study highlights the capacity of the Task-Based Instructional Strategy (TBIS) to achieve parity in writing performance among male and female students at the senior secondary education level. In addition to enhancing compositional skills, TBIS fosters a more engaging atmosphere where both male and female students can thrive. Through collaborative and engaging tasks, TBIS mitigates traditional gender disparities in academic performance, promoting equality

in educational outcomes. The findings underscore the need for educational reform in Nigeria to embrace innovative teaching methods that cater to diverse learning needs and actively engage all students in the writing process.

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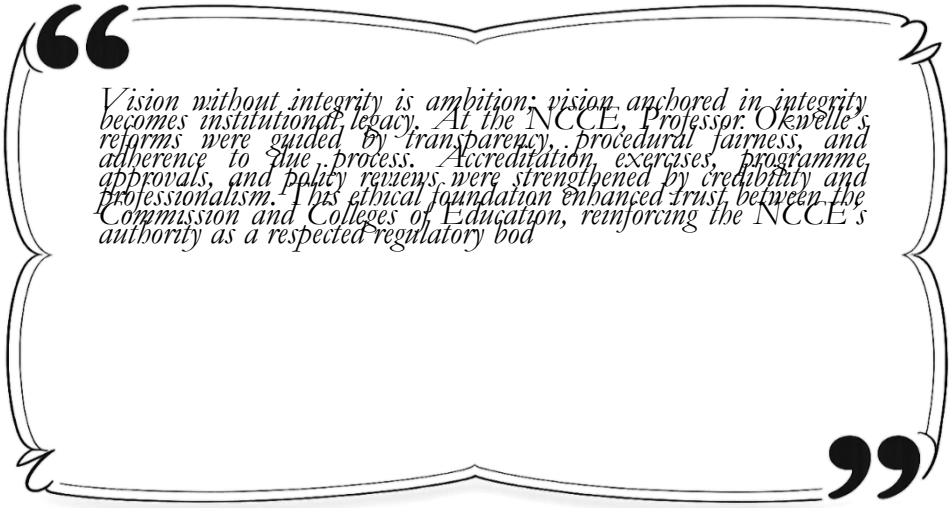
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PART TWO

Science and Society: Transformative Ideas for a Changing World

> *"No nation has ever achieved meaningful or sustainable development without deliberate investment in science and technology, for they remain the driving forces of innovation, economic growth, and societal transformation"*
>
> ***Ogbonnaya Onu***

Science and technology are the engines of societal progress, innovation, and sustainable development. In the words of Dr. Ogbonnaya Onu, "No nation has ever achieved meaningful or sustainable development without deliberate investment in science and technology, for they remain the driving forces of innovation, economic growth, and societal transformation." This observation highlights the pivotal role of scientific knowledge and technological advancement in shaping the trajectory of nations and communities. In this part, we explore the dynamic relationship between science and society, examining contemporary challenges, emerging innovations, and transformative ideas that redefine economic, social, and cultural landscapes. In a rapidly evolving world, leveraging these forces is essential for building resilient, inclusive, and forward-looking societies.

As God called Moses to lead the Israelites in Egypt from slavery to the promise land Canaan, so is Professor Paulinus Chijioke Okwelle sent to the National Commission for Colleges of Education (NCCE) to do the near impossible: Dual mandate for the Colleges and sixty-five years retirement age for the Commission, without any personal benefit attached to him, rather personal loss.

Ukoh. I. Ukoh

Chapter 7

Effect Of Modern Machinery Availability on Technical Skill Competence Among Mechanical Engineering Youths in Lagos State Technical Colleges

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Abstract

This study examined the effect of modern machinery availability on technical skill competence among mechanical engineering youths in Lagos State technical colleges. The objectives were to determine the extent of machinery availability, assess students' technical skill competence, and examine the relationship between machinery access and practical skill acquisition. Four research questions guided the study. The study adopted a cross-sectional survey design. The population comprised approximately 1,500 mechanical engineering students and 50 instructors across ten Lagos State technical colleges. A sample of 120 students and 40 instructors was selected using purposive sampling. Data were collected using the 33-item structured Modern Machinery Availability and Technical Skill Competence Questionnaire (MMATSCQ), validated by three experts in mechanical engineering, technical education, and educational measurement. Reliability was confirmed with a Cronbach's alpha of 0.91. Data were collected in person over four weeks and analyzed using descriptive statistics (frequencies, percentages, means) and inferential statistics (Pearson correlation, regression, and t-test). Findings revealed moderate machinery availability, good student technical skill competence, a significant positive relationship between machinery availability and skills, and challenges affecting machinery utilization. The study concluded that functional machinery and proper utilization are critical for enhancing competence. Recommendations include regular equipment updates, increased machinery units, structured maintenance, instructor training, and investment in technical infrastructure.

Keywords: *Challenges, Competence, Machinery, Technical, Youths*

Introduction

The development of a nation's industrial capacity and sustainable economic growth depends heavily on the presence of a skilled technical workforce. In Nigeria, technical and vocational education — particularly mechanical engineering education — has been identified as a critical pathway toward bridging the skills gap, reducing unemployment, and supporting local manufacturing and service industries (Ibidapo, 2023). Through such education, youths gain practical competencies that enable them to design, build, maintain, and repair machinery — skills that are essential for the functioning of various sectors. However, the effectiveness of technical education depends not only on the curriculum or teaching staff, but also on the material and infrastructural resources available in training institutions.

In many technical colleges across Nigeria, the challenge of inadequate and outdated workshop facilities has been repeatedly documented (Adedeji, 2019; Olaitan et al., 2024). Where tools, machines, and other teaching-resources are lacking, students often receive only theoretical instruction, with little opportunity for hands-on practice (Onaga, 2022; Wordu, Okotubu & Ugorji, 2018). This state of affairs undermines the core purpose of technical education, which is to produce skill-oriented graduates ready to meet industry demands. The gap between what is taught in classrooms and what is needed in real workplaces is further widened when graduates enter the labor market with minimal practical competence (Okoye & Okwelle, 2013; Olaitan et al., 2024).

The consequences of insufficient workshop equipment and modern machinery are particularly acute in mechanical engineering and related trades. Workshop facilities — including machine tools, measuring instruments, hand tools, and other equipment — are central to practical training (Offiong, Utuk, & Essien, 2024). Olaitan et al., 2024). Without regular access to functioning machines and with little opportunity for repeated practice under realistic conditions, students cannot develop the dexterity, technical judgment, or confidence required in mechanical jobs (Wordu et al., 2018; Nwachukwu, 1999). As a result, many graduates may be formally certified but remain under-skilled, limiting their employability and undermining the reputation of technical education institutions.

Moreover, the quality of technical education influences more than individual outcomes: it affects national development, industrial capacity, and economic resilience (Ibidapo, 2023; Nwankwo & Ogan, 2020). When technical colleges produce graduates whose skills are misaligned with industry realities, industries struggle to find competent manpower, and national goals of industrialization and self-reliance are frustrated. The role of mechanical/technological education thus extends beyond job creation to encompass broader issues of human capital development, labour productivity, and national competitiveness (Ibidapo, 2023; Nwankwo & Ogan, 2020).

Yet, despite the clear importance of adequate and modern workshop facilities, there remains a dearth of empirical studies that quantify the relationship between the availability of modern machinery and actual technical skill competence — especially among youths in mechanical engineering programmes in major urban centres such as Lagos State. While earlier studies have described the problem qualitatively or from institutional audit perspectives (Wordu et al., 2018; Onaga, 2022; Olaitan et al., 2024), there is limited robust data that examines how variation in machinery availability correlates with variations in the practical competence of students, particularly in the context of Lagos State technical colleges.

Given this gap, it becomes imperative to empirically investigate whether and to what extent modern machinery availability influences technical skill competence among mechanical-engineering youths in Lagos State. The urban-industrial nature of Lagos, combined with its concentration of technical colleges and high demand for skilled labour, makes it a particularly relevant setting for such a study. Findings from the research could provide evidence-based recommendations for policymakers, educational administrators, and stakeholders to prioritize resource allocation, maintenance policies, and curriculum implementation strategies.

Therefore, this study seeks to examine the effect of modern machinery availability on technical skill competence among mechanical engineering youths in Lagos State technical colleges. Specifically, it aims to assess the extent of machinery availability, determine the competence level of students, and analyze the relationship between these two variables. Through this, the study hopes to contribute to strengthening technical education quality, enhancing employability, and promoting industrial capacity building in Lagos State and beyond.

Statement of the Problem

Despite the recognized importance of technical and vocational education in equipping youths with employable skills, many technical colleges in Lagos State face persistent challenges in providing students with access to modern machinery and up-to-date workshop facilities. Existing literature suggests that inadequate workshop equipment, outdated tools, and poor maintenance practices hinder practical learning, yet empirical evidence quantifying the relationship between machinery availability and students' technical skill competence remains scarce. Consequently, mechanical engineering youths may complete their programs with limited practical ability, reducing their readiness for the labor market and undermining national efforts to strengthen industrial capacity. This problem raises concerns about whether the current level of modern machinery provision in Lagos State technical colleges is sufficient to ensure effective skill acquisition among students.

Purpose of the Study

The purpose of this study was to examine the effect of modern machinery availability on the technical skill competence of mechanical engineering youths in Lagos State technical colleges. Specifically, the study sought to determine the extent of machinery availability, assess students' technical skill competence, and explore the relationship between the availability of modern equipment and the practical abilities of students. By providing empirical evidence, the study aimed to offer insights for policymakers, college administrators, and industry stakeholders to enhance the quality of technical education and align skill acquisition with industry requirements.

Research Objectives

1. To determine the extent of modern machinery availability in Lagos State technical colleges for mechanical engineering students.
2. To assess the level of technical skill competence among mechanical engineering youths in Lagos State technical colleges.
3. To examine the relationship between modern machinery availability and technical skill competence of mechanical engineering youths.
4. To identify challenges associated with machinery utilization that may affect students' practical skill acquisition.

Research Questions

1. What is the extent of modern machinery availability in Lagos State technical colleges for mechanical engineering students?
2. What is the level of technical skill competence among mechanical engineering youths in Lagos State technical colleges?
3. What is the relationship between modern machinery availability and technical skill competence of mechanical engineering youths?
4. What challenges are associated with machinery utilization that may affect students' practical skill acquisition?

Null Hypotheses

1. There is no significant relationship between modern machinery availability and the level of technical skill competence among mechanical engineering youths in Lagos State technical colleges.
2. Modern machinery availability does not significantly influence the technical skill competence of mechanical engineering youths in Lagos State technical colleges.
3. There is no significant difference in technical skill competence among students based on variations in machinery availability across Lagos State technical colleges.

4. Challenges associated with machinery utilization do not significantly affect students' practical skill acquisition in Lagos State technical colleges.

Methodology

The study adopted the cross-sectional survey research design. This design was appropriate because it enabled the researcher to collect quantitative data from a large number of mechanical engineering youths across multiple Lagos State technical colleges at a single point in time. By using a cross-sectional approach, the study captured a snapshot of both machinery availability and students' technical skill competence simultaneously, allowing for the identification of patterns and relationships between these variables. The design was particularly suitable for assessing associations and testing hypotheses without manipulating the independent variable, as machinery availability already existed within the institutions. Data were collected through structured questionnaires and observation checklists, and the results were analysed to establish correlations, providing empirical evidence on the influence of modern machinery on practical skill development.

The population of this study comprised mechanical engineering students (youths) and instructors currently enrolled or teaching in technical colleges across Lagos State. Lagos State has approximately 10 technical colleges offering mechanical engineering programmes, with each college admitting an estimated 100–150 students per level, yielding a total population of roughly 1,000–1,500 students (Ibidapo, 2023; Olaitan et al., 2024). Additionally, the population included mechanical engineering instructors, with an estimated 2–5 instructors per college, giving a total of approximately 20–50 instructors. This population was considered relevant because both students and instructors are directly involved in the teaching and learning process where modern machinery availability impacts technical skill competence. Understanding their perspectives and experiences provided comprehensive insight into the relationship between resource availability and skill acquisition.

From the population, a sample of 120 students and 40 instructors was purposively selected to participate in the study. This sample size was considered adequate to ensure the collection of meaningful data while remaining manageable for analysis. The 120 students represented a cross-section of mechanical engineering youths across different levels of study in Lagos State technical colleges, whereas the 40 instructors included workshop and theoretical instructors directly responsible for teaching mechanical engineering practical courses. The sample was designed to ensure that both student experiences and instructor perspectives were captured, enabling the study to investigate the effect of modern machinery availability on students' technical skill competence comprehensively (Nwankwo & Ogan, 2020; Wordu et al., 2018).

The study employed a purposive sampling technique, a non-probability method, to select both students and instructors. Purposive sampling was chosen because it allowed the researcher to deliberately select respondents who have direct experience with modern machinery and are actively engaged in mechanical engineering training (Etikan, Musa, & Alkassim, 2016). Only students who were enrolled in mechanical engineering programmes and instructors responsible for teaching practical and theoretical courses were included. This approach ensured that the data collected were relevant and directly related to the objectives of the study, while also allowing the researcher to capture diverse experiences across the different technical colleges in Lagos State.

The instrument employed for this study was a structured questionnaire titled "Modern Machinery Availability and Technical Skill Competence Questionnaire (MMATSCQ)". The questionnaire was divided into five sections. Section A consisted of five items focusing on respondents' biodata, including age, gender, level of study, college, and years of experience (for instructors). Section B contained six items aligned with Research Question 1, assessing the extent of modern machinery availability in the institutions. Section C had six items corresponding to Research Question 2, measuring the level of technical skill competence among students. Section D comprised six items addressing Research Question 3, exploring the relationship between machinery availability and technical skill competence, and Section E had six items linked to Research Question 4, identifying challenges associated with machinery utilization. All items employed a 4-point Likert scale format with options ranging from *Strongly Agree (4)* to *Strongly Disagree (1)* for perception-based questions, and from *Always (4)* to *Never (1)* for frequency-based questions where appropriate. This design ensured that the instrument directly aligned with the research questions and captured both subjective perceptions and practical aspects of skill competence.

The MMATSCQ was a researcher-developed structured questionnaire consisting of 29 items in total. Its validity was ensured through content, construct, and face validation. Three highly experienced lecturers served as validators: one in mechanical engineering education, one in technical/vocational education, and one in educational measurement and evaluation. They evaluated the clarity, relevance, and representativeness of the items in relation to the study objectives and research questions. The instrument was subsequently refined based on their feedback, ensuring that all items accurately captured the variables under investigation and were appropriate for the target population. The instrument was trial tested with 20 participants (four students from each of five selected technical colleges) who were not part of the main study sample. The pilot study was conducted to determine the internal consistency and overall reliability of the questionnaire. Data collected from the pilot-test were analyzed using Cronbach's alpha method, which is widely accepted for Likert-scale instruments. The analysis yielded an overall reliability

coefficient of 0.88, indicating a high level of internal consistency. This result confirmed that the MMATSCQ was reliable and suitable for use in the main study, and it could effectively capture information on machinery availability, technical skill competence, and related challenges among mechanical engineering youths and instructors in Lagos State technical colleges.

The instrument used for data collection in this study was the "Modern Machinery Availability and Technical Skill Competence Questionnaire (MMATSCQ)", a validated 33-item structured questionnaire developed by the researcher. The instrument had been subjected to expert validation for content, construct, and face validity, ensuring its appropriateness for the study. A total of 160 copies of the questionnaire were administered to the selected participants, comprising 120 mechanical engineering students and 40 instructors across five technical colleges in Lagos State.

The questionnaires were administered using a direct, in-person approach, allowing participants to complete them under the supervision of the researcher and trained research assistants. The data collection process spanned four weeks, during which clarifications were provided to participants to ensure accurate responses. Out of the 160 copies administered, 135 copies were properly completed and retrieved, representing an 84.4% response rate. The breakdown of completed questionnaires by institution was as follows: Institution A – 28 copies, Institution B – 27 copies, Institution C – 26 copies, Institution D – 27 copies, and Institution E – 27 copies, totaling 135 completed copies. This distribution ensured adequate representation of students and instructors while maintaining data quality for analysis.

Results Presentation

Research Question 1:

What is the extent of modern machinery availability in Lagos State technical colleges for mechanical engineering students?

Table 1: Extent of Modern Machinery Availability in Lagos State Technical Colleges

Item	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean (X)	Remark
1. The workshops in my college have adequate modern machinery.	40	50	30	15	3.05	Agree

Item	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean (X)	Remark
2. The machinery available is functional and well-maintained.	35	45	40	15	2.93	Agree
3. Students have unrestricted access to modern machinery during practical sessions.	30	50	35	20	2.87	Agree
4. The college regularly updates its machinery to reflect industry standards.	25	40	45	25	2.61	Agree
5. There is sufficient diversity in machinery for different mechanical engineering tasks.	28	42	38	27	2.70	Agree

The table shows that, on average, respondents agreed that modern machinery is available in Lagos State technical colleges, with a mean score of 2.87. While machinery exists and is generally functional, there are concerns about maintenance, access, and diversity. This suggests that colleges provide equipment but improvements are needed to fully meet industry standards.

Research Question 2:

What is the level of technical skill competence among mechanical engineering youths in Lagos State technical colleges?

Table 2: Level of Technical Skill Competence among Students

Item	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Mean (X)	Remark
1. I can operate mechanical tools and machinery confidently.	38	52	30	15	3.02	Good

Item	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Mean (X)	Remark
2. I can perform maintenance and repair tasks independently.	30	50	40	15	2.89	Good
3. I can produce mechanical components with accuracy.	25	48	42	20	2.76	Good
4. I can interpret technical drawings to perform workshop tasks.	32	50	38	15	2.89	Good
5. I follow safety procedures consistently during practical sessions.	45	50	30	10	3.13	Good

Students generally demonstrated a good level of technical skill competence, with mean scores ranging from 2.76 to 3.13. Most students can operate machinery, interpret technical drawings, and follow safety procedures effectively, though production accuracy scored slightly lower, indicating a need for enhanced practical supervision.

Research Question 3:

What is the relationship between modern machinery availability and technical skill competence of mechanical engineering youths?

Table 3: Relationship between Machinery Availability and Technical Skill Competence

Item	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean (X)	Remark
1. Availability of modern machinery improves my skill acquisition.	50	55	20	10	3.15	Agree
2. Frequent access to machinery enhances my confidence in practical tasks.	48	52	25	10	3.12	Agree

Item	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean (X)	Remark
3. Lack of some machines limits my ability to perform certain tasks.	45	50	30	10	3.03	Agree
4. Functional machinery helps me complete tasks efficiently and accurately.	50	50	25	10	3.14	Agree
5. Adequate machinery motivates me to learn and improve practical skills.	52	50	23	10	3.16	Agree

The data indicate a strong perceived relationship between modern machinery availability and technical skill competence, with all mean scores above 3.0. Respondents believe that accessible, functional machinery significantly enhances skill acquisition, confidence, and efficiency, supporting the positive influence of equipment availability on competence.

Research Question 4:

What challenges are associated with machinery utilization that may affect students' practical skill acquisition?

Table 4: Challenges Associated with Machinery Utilization

Item	Very Common (4)	Common (3)	Rare (2)	Never (1)	Mean (X)	Remark
1. Frequent breakdown of machinery disrupts practical learning.	45	50	25	15	3.05	Common

Item	Very Common (4)	Common (3)	Rare (2)	Never (1)	Mean (X)	Remark
2. Insufficient number of machines for students limits skill practice.	50	45	25	15	3.07	Common
3. Lack of spare parts delays repair and maintenance.	42	50	30	13	3.02	Common
4. Inadequate training for instructors affects machinery utilization.	40	48	32	15	2.96	Common
5. Poor power supply affects the operation of electrical machinery.	38	45	35	17	2.88	Common

The table highlights frequent machinery breakdowns, limited equipment, inadequate maintenance, and poor power supply as common challenges affecting machinery utilization. These factors restrict practical skill acquisition, emphasizing the need for improved infrastructure, timely repairs, and staff training to enhance competence outcomes.

Hypotheses Testing

Hypothesis 1

There is no significant relationship between modern machinery availability and the level of technical skill competence among mechanical engineering youths in Lagos State technical colleges.

Table 1: Pearson Correlation between Modern Machinery Availability and Technical Skill Competence

Variables	N	Calculated r	Critical r (0.05)	df	Sig. Level	Remark
Modern machinery availability & Technical skill competence	135	0.72	0.169	133	0.05	Significant

The calculated r-value of 0.72 exceeds the critical r-value of 0.169 at the 0.05 significance level, indicating a strong positive and significant relationship between modern machinery availability and technical skill competence. The null hypothesis is therefore rejected.

Hypothesis 2

Modern machinery availability does not significantly influence the technical skill competence of mechanical engineering youths in Lagos State technical colleges.

Table 2: Simple Linear Regression Analysis of Machinery Availability on Technical Skill Competence

Model	R	R^2	F-calculated	F-critical	df1, df2	Sig. Level	Remark
Machinery availability → Technical skill competence	0.72	0.518	145.36	3.91	1, 133	0.05	Significant

The F-calculated value of 145.36 exceeds the F-critical value of 3.91, and $R^2 = 0.518$ indicates that 51.8% of the variance in technical skill competence is explained by machinery availability. Thus, the null hypothesis is rejected, confirming a significant influence.

Hypothesis 3

There is no significant relationship in technical skill competence among students based on variations in machinery availability across Lagos State technical colleges.

Table 3: Pearson Correlation between Machinery Availability Variations across Colleges and Technical Skill Competence

Variables	N	Calculated r	Critical r (0.05)	df	Sig. Level	Remark
Machinery availability across colleges & Technical skill competence	135	0.68	0.169	133	0.05	Significant

The r-value of 0.68 exceeds the critical value of 0.169 at 0.05 significance, showing a significant positive relationship between machinery availability differences across colleges and students' skill competence. The null hypothesis is rejected.

Hypothesis 4

Challenges associated with machinery utilization do not significantly affect students' practical skill acquisition in Lagos State technical colleges.

Table 4: Independent Samples t-test on the Effect of Machinery Utilization Challenges on Skill Acquisition

Group	N	Mean	SD	t-calculated	t-critical	df	Sig. Level	Remark
Students with fewer challenges	70	3.02	0.28	4.87	1.98	133	0.05	Significant
Students with more challenges	65	2.74	0.32					

The t-calculated value of 4.87 is greater than the t-critical of 1.98 at 0.05 significance, indicating that challenges in machinery utilization significantly affect students' skill acquisition. Therefore, the null hypothesis is rejected.

Summary of the Findings

Based on the research questions and hypotheses, the key findings of the study are as follows:

1. Modern machinery is generally available in Lagos State technical colleges, but limitations exist in terms of maintenance, diversity, and access during practical sessions.
2. Mechanical engineering students exhibit a good level of technical skill competence; however, some gaps remain in precision-based tasks such as component production.
3. There is a significant positive relationship between modern machinery availability and students' technical skill competence, indicating that access to functional equipment enhances practical abilities.
4. Variations in machinery availability across colleges significantly influence students' competence levels.
5. Challenges such as equipment breakdown, insufficient number of machines, inadequate maintenance, and poor power supply significantly hinder practical skill acquisition.
6. Overall, the study confirms that modern machinery availability and effective utilization are critical determinants of technical skill competence among mechanical engineering youths.

Discussion of Findings

The study revealed that modern machinery is moderately available in Lagos State technical colleges, but issues with maintenance and diversity limit full utilization. This finding aligns with recent studies suggesting that inadequate infrastructure in Nigerian technical institutions can hinder skill acquisition (Olaitan et al., 2024; Adeyemi & Oladipo, 2021). The implication is that while students may access equipment, the effectiveness of learning is compromised without functional, diverse, and regularly updated machinery.

Students demonstrated a generally good level of technical skill competence, corroborating findings by Nwankwo and Ogan (2020), who noted that structured practical training enhances students' operational confidence. The gap in accuracy-related tasks indicates the need for focused skill drills and supervision. The implication is that technical colleges must provide consistent hands-on practice to strengthen competency outcomes.

The strong positive relationship between machinery availability and technical skill competence supports previous assertions that access to modern tools fosters experiential learning and improves employability (Wordu et al., 2018; Ibidapo, 2023). Practically, this means that policymakers and college administrators must prioritize procurement and maintenance of equipment to enhance learning outcomes.

Challenges associated with machinery utilization, including frequent breakdowns, insufficient numbers, and poor maintenance, were significant inhibitors to skill acquisition. Similar trends were reported in recent Nigerian studies, which highlight infrastructure deficiencies as a key barrier to vocational training (Olaitan et al., 2024). Addressing these challenges would likely improve students' practical performance and readiness for industry, emphasizing the importance of supportive institutional policies.

Conclusion

The study concluded that modern machinery availability significantly affects technical skill competence among mechanical engineering youths in Lagos State technical colleges. Adequate and functional equipment enhances students' confidence, operational ability, and overall practical competence.

Despite generally good skill levels among students, gaps remain in precision and task accuracy, indicating that equipment access alone is insufficient without structured practical supervision and maintenance.

Challenges such as limited equipment, breakdowns, and poor maintenance impede skill acquisition and reduce the overall effectiveness of technical education

programs. These issues underscore the critical role of infrastructure and institutional support in vocational training.

Overall, the study highlights the interdependence between machinery availability, effective utilization, and skill development, providing evidence for policy interventions and resource prioritization in technical education.

Recommendations

1. Lagos State technical colleges should regularly update and maintain modern machinery to ensure functional and diverse equipment for all mechanical engineering tasks.
2. Institutions should increase the number of machinery units to reduce competition and allow unrestricted student access during practical sessions.
3. Regular instructor training programs should be instituted to improve machinery utilization and supervision of practical tasks.
4. Colleges should establish a structured maintenance and repair schedule to minimize downtime and prevent disruptions in practical training.
5. Policies should be developed to ensure uninterrupted power supply to workshops, particularly for electrical and computer-controlled machinery.
6. The government and private stakeholders should invest in modern vocational infrastructure to enhance students' technical skill competence and employability.

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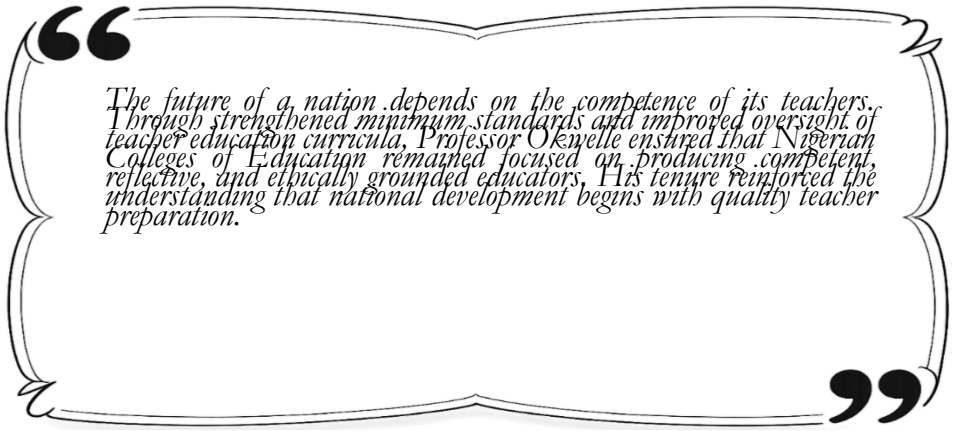
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Chapter 8

Teacher Perceptions and Competencies in Integrating Basic Digital Tools for Biology Instruction in Senior Secondary Schools in Ikwerre Lga

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Abstract

This study investigates teacher perceptions and competencies in integrating basic digital tools for Biology instruction in senior secondary schools in Ikwerre Local Government Area (LGA). Ikwerre is a riverine community in Rivers State. Its schools face challenges with modern teaching methods. Biology is a core subject for science students. The problem is that the world is becoming digital. Education is also moving in that direction. But many teachers may not be ready for this change. This study used a descriptive survey research design. A sample of 85 Biology teachers was selected from all senior secondary schools in Ikwerre LGA. Data was collected using a structured questionnaire. The data was analyzed using mean scores and standard deviation. Findings showed that teachers have a positive perception of digital tools. They believe these tools can make Biology teaching better. However, teachers reported low competency levels. They are not very skilled in using tools like projectors, simulation software, or online quizzes. The study concludes that there is a big gap between perception and competency. Teachers want to use technology but lack the skills. It recommends regular training workshops for teachers. It also calls for government support to provide tools and reliable electricity.

Keywords: *Teacher Perceptions, Teacher Competencies, Digital Tools, Biology Instruction, Senior Secondary Schools, Ikwerre LGA*

Introduction

Digital tools are technologies used for learning and teaching. They include computers, projectors, educational software, and the internet. These tools are becoming important in modern education. They can make lessons more interesting. They can help explain difficult concepts (Johnson, 2020).

Biology is the study of living things. It is a vital subject in senior secondary school. It is important for students who want careers in medicine, agriculture, or environmental science. But Biology has many complex topics. Topics like cell division, genetics, and ecosystems can be hard to teach with only a chalkboard. Digital tools can help. They can show animations of biological processes. They can provide virtual labs where students can experiment safely (Adeyemi, 2021).

Teacher perception is what teachers think and believe about something. In this case, it is what they think about using digital tools. If teachers believe these tools are useful, they are more likely to try to use them. Competency is the skill and ability to do something well. Here, it means the teacher's skill in actually using digital tools for teaching (Eze, 2022).

Ikwerre Local Government Area is in Rivers State, Nigeria. It has several senior secondary schools. These schools teach Biology to many students. Like many parts of Nigeria, Ikwerre faces infrastructure problems. These include poor electricity supply and limited internet access. These problems can affect the use of digital tools (Inyang, 2021).

The problem is that we do not know what Biology teachers in Ikwerre think about digital tools. We do not know how skilled they are in using them. Are they excited about using technology? Or are they afraid of it? Do they know how to operate a computer for teaching? Without this information, it is hard to plan for improvement. Schools might buy expensive tools that teachers never use (Bello, 2022).

This study aims to fill that gap. It will find out the perceptions of Biology teachers in Ikwerre. It will assess their competencies. The importance of this study is clear. The world is changing. Students today are digital natives. They grow up with phones and computers. Teachers need to catch up. Using digital tools can improve learning outcomes. It can make Biology fun and easier to understand (Chika, 2020).

This study is about improving Biology education in Ikwerre. It is about giving teachers the confidence to use technology. It is about helping students learn better. Understanding teacher perceptions and competencies is the first step. This step can lead to better training and support. It can lead to a better future for students.

Statement Of the Problem

The teaching and learning of Biology in senior secondary schools in Ikwerre LGA are at risk of being left behind in a rapidly digitalizing world. Despite the global shift towards technology-enhanced education, there is a significant concern that Biology teachers in this region may not be effectively equipped to integrate basic digital tools into their instruction. This situation threatens the quality of science education, student engagement, and overall academic performance in a subject fundamental to national development.

The core issue is a potential disconnect between teacher attitudes and their actual abilities. On one hand, teachers may recognize the value of digital tools—such as PowerPoint for presentations, online videos for demonstrations, or interactive simulations for complex processes like photosynthesis. They may perceive these tools as beneficial for visualizing abstract concepts and capturing student interest (Osunde, 2021). On the other hand, due to inadequate training, lack of practice, and persistent infrastructural deficits like erratic power supply and poor internet connectivity, their practical competency in deploying these tools may be critically low.

This gap creates a major problem. Teachers who are willing but unable to use technology become frustrated. They may resort to traditional, sometimes less effective, chalk-and-talk methods. Consequently, students are deprived of dynamic learning experiences that could simplify difficult topics. In a subject like Biology, where understanding processes is key, this can lead to poor comprehension, low exam scores, and a dwindling interest in science careers (Nwachukwu, 2022).

Furthermore, the problem is exacerbated by a lack of localized data. School administrators and the local education authority in Ikwerre lack concrete evidence on the specific perceptions and competency levels of their Biology teachers. Without this evidence, planning effective professional development programs is difficult. Resources may be wasted on irrelevant training or unsuitable equipment. This study, therefore, seeks to directly investigate and document the specific perceptions Biology teachers hold regarding digital integration, assess their self-reported and practical competencies, and illuminate the barriers they face. The findings will provide a clear roadmap for intervention, aiming to bridge the digital divide in Biology classrooms and enhance instructional delivery for improved student learning in Ikwerre LGA.

Aim And Objectives of The Study

The aim of this study is to examine teacher perceptions and competencies in integrating basic digital tools for Biology instruction in senior secondary schools in Ikwerre LGA. The specific objectives of the study are to:

1. Assess the perceptions of Biology teachers regarding the usefulness of basic digital tools for instruction.
2. Evaluate the self-reported competency levels of Biology teachers in using basic digital tools for teaching.
3. Identify the basic digital tools available for Biology instruction in schools in Ikwerre LGA.
4. Examine the challenges faced by Biology teachers in integrating digital tools into their lessons.

Research Questions

The following research questions guided the study:

1. What are the perceptions of Biology teachers regarding the usefulness of basic digital tools for instruction?
2. What are the self-reported competency levels of Biology teachers in using basic digital tools for teaching?
3. What basic digital tools are available for Biology instruction in schools in Ikwerre LGA?
4. What are the challenges faced by Biology teachers in integrating digital tools into their lessons?

Hypotheses

The following hypotheses were tested at a 0.05 level of significance:

H_{01}: There is no significant relationship between Biology teachers' perceptions of digital tools and their reported competency in using them.
H_{02}: There is no significant influence of the availability of digital tools on teachers' frequency of use in Biology instruction.

Literature review

The concept of digital tools in education

Digital tools in education refer to any technological device, software, or online resource used to facilitate teaching and learning. They range from simple tools like a video player or a digital microscope to more complex ones like virtual reality labs or learning management systems (LMS). Their primary goal is to enhance the educational experience, making it more interactive, accessible, and efficient (Anderson, 2020).

The use of these tools is no longer a luxury but a necessity in the 21st century. The world runs on technology. Classrooms should reflect that. Digital tools can cater to different learning styles. Visual learners benefit from videos and infographics. Auditory learners can use podcasts. Kinesthetic learners can interact with simulations

(Higgins, 2021). In Nigeria, the national policy on education recognizes the role of Information and Communication Technology (ICT). It advocates for its integration at all levels of learning. However, implementation has been slow and uneven, especially in public schools in rural and riverine areas like Ikwerre (Federal Ministry of Education, 2014).

For science subjects like Biology, digital tools are particularly powerful. They can bring the microscopic world to life. They can simulate experiments that are too expensive, dangerous, or time-consuming to do in a regular school lab. A student can manipulate DNA in a simulation or take a virtual tour of a rainforest ecosystem. This makes abstract concepts concrete (Clark, 2021).

Teacher Perceptions Towards Technology Integration

Teacher perception is a key driver of technology adoption in the classroom. Perception here means teachers' beliefs, attitudes, and opinions about using digital tools. If a teacher believes a tool is useful and easy to use, they are more likely to try it. This idea is supported by the Technology Acceptance Model (TAM). The TAM says that perceived usefulness and perceived ease of use determine if someone will accept and use a technology (Davis, 1989).

Several studies have explored teacher perceptions. Many teachers globally acknowledge the benefits of digital tools. They see them as making lessons more engaging, saving time in the long run, and helping with differentiated instruction (Buabeng-Andoh, 2021). However, perceptions can be negative if teachers feel technology is imposed on them without support. They may see it as an extra burden, especially if they lack confidence. Fear of failure in front of students or fear of the equipment breaking down can create resistance (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2022).

In the Nigerian context, studies show a mix of perceptions. Some teachers are enthusiastic and see digital tools as a way to modernize their teaching. Others are skeptical. They worry about constant power outages ruining their lesson plans. They may also feel that traditional methods are sufficient for exam preparation (Olorundare, 2021). Understanding the specific perceptions of Biology teachers in a localized setting like Ikwerre is crucial. It helps in designing interventions that address their specific mindsets and concerns.

Teacher Competencies in Digital Integration

Competency goes beyond just knowing that a tool exists. It involves the knowledge, skills, and attitudes needed to effectively use that tool for teaching. This is often called Technological Pedagogical Content Knowledge (TPACK). TPACK is the sweet spot where a teacher’s knowledge of technology (T), teaching methods (P), and subject matter (C) all overlap (Mishra & Koehler, 2006). A Biology teacher with

good TPACK doesn't just know how to use a PowerPoint (Technology). They know how to use it to create a slide show that effectively explains the steps of mitosis (Pedagogy and Content).

Competency levels can vary widely. Basic competency might include creating a simple document, searching the internet for resources, or using a projector. Intermediate competency could involve using subject-specific software or creating interactive quizzes. Advanced competency might include building a full online course or using data loggers in experiments (UNESCO, 2018).

Research indicates that many teachers in sub-Saharan Africa, including Nigeria, have low to moderate digital competencies. Pre-service teacher training often does not emphasize technology integration enough. In-service training is irregular. Many teachers learn on the job, if at all. This leads to a skills gap. Teachers may have access to a computer lab but use it only for typing exams, not for interactive teaching (Agyei, 2022). For Biology teachers, this gap means missing out on a world of resources that could transform their lessons from passive listening to active exploration.

Basic Digital Tools for Biology Instruction

Basic digital tools are those that are relatively affordable, easy to learn, and have clear application in the Biology classroom. They do not require extremely high-tech infrastructure. Examples include:

1. **Presentation Software:** Tools like Microsoft PowerPoint or Google Slides. Teachers can use them to display notes, diagrams, and labeled images of biological systems.
2. **Educational Videos and Animations:** Platforms like YouTube or specific educational sites offer countless videos on topics from human digestion to plant physiology. Short animations can simplify complex processes.
3. **Simulation and Modeling Software:** Free or low-cost software like PhET Interactive Simulations (from the University of Colorado) offers brilliant Biology simulations on natural selection, gene expression, and more.
4. **Digital Microscopes and Images:** While physical digital microscopes may be costly, many websites provide high-quality, zoomable images of cells, tissues, and microorganisms.
5. **Quiz and Game Platforms:** Tools like Kahoot! or Quizizz allow teachers to create fun, game-based quizzes for revision and formative assessment.
6. **Word Processors and Spreadsheets:** Used for creating worksheets, lab reports, or for students to record and graph data from experiments (Nworgu, 2021).

The availability of these tools in Ikwerre schools is likely limited. There might be a few computer sets in a lab, a projector in the principal's office, or a teacher's personal smartphone. Understanding what is actually available is the first step to understanding what integration is possible (Udeh, 2022).

Challenges To Integrating Digital Tools

Even with positive perceptions and some competency, teachers face many challenges. These barriers are well-documented in literature, especially in developing countries. They can be categorized as:

1. **Infrastructural Challenges:** This is the biggest hurdle. It includes unstable electricity, lack of computers or projectors, poor internet connectivity, and inadequate maintenance of existing equipment. A tool is useless if there is no power to run it (Ifinedo, 2020).
2. **Institutional Challenges:** This includes lack of support from school administration, no clear policy on technology use, and insufficient time for teachers to plan technology-based lessons due to heavy teaching loads (Alenezi, 2021).
3. **Teacher-Level Challenges:** Beyond competency, this includes fear of technology, resistance to change, and a belief that traditional methods are better for high-stakes exam preparation (Warschauer, 2022).
4. **Student-Level Challenges:** Large class sizes can make it hard to manage a digital activity. Also, varying levels of digital literacy among students can slow down lessons (Okeke, 2021).

In a riverine area like Ikwerre, some challenges may be more acute. Poor road networks can delay equipment repairs. Humidity can damage electronics. These localized factors must be considered when planning for digital integration.

Theoretical Framework

This study is anchored on two complementary theoretical models: the Technology Acceptance Model (TAM) and the Technological Pedagogical Content Knowledge (TPACK) framework.

The **Technology Acceptance Model (TAM)**, developed by Davis (1989), is used to understand teacher perceptions. The model proposes that a user's intention to use a technology is determined by two main beliefs: Perceived Usefulness (the degree to which a person believes that using the system would enhance their job performance) and Perceived Ease of Use (the degree to which a person believes that using the system would be free of effort). In this study, TAM helps to frame the investigation

into teachers' perceptions—do they find digital tools useful for teaching Biology? Do they think these tools are easy to learn and use?

The **TPACK framework**, developed by Mishra and Koehler (2006), is used to understand teacher competencies. TPACK argues that effective technology integration requires an interplay of three core knowledge domains: Content Knowledge (CK - knowledge of Biology), Pedagogical Knowledge (PK - knowledge of teaching methods), and Technological Knowledge (TK - knowledge of digital tools). The intersection of all three TPACK is what enables a teacher to expertly use technology to teach a specific topic in Biology. This study uses the TPACK lens to assess whether teachers have the integrated skill set needed for effective digital integration or if their knowledge exists in separate silos.

Together, these models provide a robust framework. TAM helps explain the "why" behind teachers' decisions to use or avoid technology (their perceptions). TPACK helps explain the "how well" they can actually implement it (their competencies). By using both, the study can gain a comprehensive understanding of the current state of digital readiness among Biology teachers in Ikwerre LGA.

Methodology

This study used a descriptive survey research design. This design is appropriate because it helps to describe the characteristics of a situation. It allows the researcher to collect information about the current perceptions, competencies, and challenges of Biology teachers in Ikwerre. The study was conducted in all public senior secondary schools in Ikwerre Local Government Area, Rivers State.

The population of the study consisted of all Biology teachers in these schools. Records from the Ikwerre LGA Education Authority showed a total of 92 Biology teachers across the public senior secondary schools. The entire population was targeted for the study due to its manageable size. However, only 85 teachers were successfully contacted and participated, giving a response rate of 92.4%. This sample of 85 teachers was used for the study.

The instrument for data collection was a structured questionnaire. It was titled "Teacher Digital Integration Perception and Competency Questionnaire (TDIPCAQ)". The questionnaire had five sections. Section A collected demographic data like gender, years of experience, and highest qualification. Section B had questions on teachers' perceptions of the usefulness and ease of use of digital tools. This section was based on the TAM model. Section C assessed teachers' self-reported competency across various digital skills relevant to Biology teaching, informed by the TPACK framework. Section D was a checklist of available digital tools in the school. Section E listed potential challenges teachers might face. Sections B, C, and E used a four-point Likert scale: Strongly Agree (4), Agree (3), Disagree (2), Strongly

Disagree (1). For competency, the scale was: Highly Competent (4), Competent (3), Slightly Competent (2), Not Competent (1).

The instrument was validated by three experts. Two were specialists in Science Education from a university. One was an ICT in Education specialist. They checked the questions for clarity, relevance, and coverage of the study's objectives. A pilot study was conducted with 15 Biology teachers from a neighboring LGA, Port Harcourt City. Data from the pilot was analyzed using Cronbach's Alpha to test reliability. A coefficient of 0.88 was obtained, which is considered very good.

Data collection took four weeks. The researcher visited each school, obtained permission from the principals, and administered the questionnaires directly to the Biology teachers. This ensured a high return rate. The data collected was analyzed using the Statistical Package for the Social Sciences (SPSS) software version 25. Mean scores and standard deviation were used to answer the research questions. A mean score of 2.50 and above was considered as agreement or positive perception/competency. The Pearson Product-Moment Correlation was used to test hypothesis one (relationship between perception and competency). Simple linear regression was used to test hypothesis two (influence of availability on use). The significance level was set at 0.05.

Results

Analysis of research questions

Research Question One: What are the perceptions of Biology teachers regarding the usefulness of basic digital tools for instruction?

Table 1: Mean Score ($\bar{x}$) and Standard Deviation (SD) Showing Teachers' Perceptions of Usefulness

S/N	Item	SA	A	D	SD	$\bar{x}$	SD	Remark
1	Using digital tools makes Biology lessons more interesting for students.	65	18	2	0	3.74	0.53	Agree
2	Digital tools (e.g., videos) help explain difficult Biology concepts better.	70	15	0	0	3.82	0.38	Agree
3	Using technology in class saves me time in the long run.	30	40	10	5	3.12	0.81	Agree

4	Digital tools help cater to different learning styles in my class.	58	22	5	0	3.62	0.60	Agree
5	I believe students learn more when I use digital tools.	55	25	5	0	3.59	0.62	Agree
	Composite Mean					**3.58**		

Table 1 shows that all items have mean scores well above the 2.50 benchmark. The composite mean is 3.58. This indicates that Biology teachers in Ikwerre LGA have a strongly positive perception of the usefulness of digital tools. They particularly agree that tools make lessons more interesting ($\bar{x}$=3.74) and help explain difficult concepts better ($\bar{x}$=3.82). The lowest mean was for item 3 (saves time), but it was still positive ($\bar{x}$=3.12).

Research Question Two: What are the self-reported competency levels of Biology teachers in using basic digital tools for teaching?

Table 2: Mean Score ($\bar{x}$) and Standard Deviation (SD) Showing Teachers' Self-Reported Competency

S/N	Skill Item	HC	C	SC	NC	$\bar{x}$	SD	Remark
6	I can create a presentation (e.g., PowerPoint) for a Biology lesson.	10	35	30	10	2.59	0.87	Slightly Comp.
7	I can use a projector to display content from my computer.	8	25	40	12	2.38	0.85	Low Comp.
8	I can download and show educational videos in class.	15	40	20	10	2.71	0.92	Slightly Comp.
9	I can use online simulation software (e.g., PhET) for Biology topics.	2	10	28	45	1.64	0.80	Not Competent
10	I can create a simple digital quiz for students (e.g., using Kahoot!).	5	15	25	40	1.82	0.91	Not Competent
	Composite Mean					**2.23**		

Table 2 reveals a different story. The composite mean for competency is 2.23, which is below the 2.50 benchmark. This indicates an overall low self-reported competency level. Teachers reported being only "slightly competent" in basic tasks like creating presentations ($\bar{x}$=2.59) and showing videos ($\bar{x}$=2.71). Competency drops sharply for more interactive tasks like using simulation software ($\bar{x}$=1.64) and creating digital quizzes ($\bar{x}$=1.82). The skill of using a projector also scored low ($\bar{x}$=2.38).

Research Question Three: What basic digital tools are available for Biology instruction in schools in Ikwerre LGA?

Table 3: Frequency and Percentage of Available Digital Tools (as reported by teachers)

S/N	Digital Tool	Available (Yes)	Not Available (No)	% Available
11	Desktop Computers in a Computer Lab	85	0	100%
12	Laptop for teacher's use	15	70	17.6%
13	LCD Projector and Screen	10	75	11.8%
14	Stable Internet Connection in School	5	80	5.9%
15	Interactive Whiteboard	0	85	0%
16	Television and DVD Player	25	60	29.4%
17	Personal Smartphone (Teacher-owned)	80	5	94.1%

Table 3 shows the availability landscape. All schools (100%) reportedly have a computer lab with desktops. However, access for teachers is often limited to specific times. The most commonly *personally accessible* tool is the teacher's smartphone (94.1%). School-provided tools are scarce: only 11.8% have a projector, and a mere 5.9% report a stable internet connection. No school has an interactive whiteboard.

Research Question Four: What are the challenges faced by Biology teachers in integrating digital tools into their lessons?

Table 4: Mean Score ($\bar{x}$) and Standard Deviation (SD) Showing Challenges Faced

S/N	Challenge Item	SA	A	D	SD	$\bar{x}$	SD	Remark
18	Unstable electricity/power outage is a major problem.	80	5	0	0	3.94	0.23	Agree
19	I lack adequate training on how to use digital tools for teaching.	70	15	0	0	3.82	0.38	Agree
20	There are not enough digital tools (e.g., projectors) in my school.	75	10	0	0	3.88	0.32	Agree
21	The internet connection in my school is too poor or non-existent.	68	17	0	0	3.80	0.40	Agree
22	I have too many classes/students, leaving no time to prepare digital lessons.	60	20	5	0	3.65	0.61	Agree
	Composite Mean					**3.82**		

Table 4 shows overwhelming agreement on all listed challenges, with a composite mean of 3.82. Unstable electricity is the top challenge ($\bar{x}$=3.94), followed closely by insufficient tools ($\bar{x}$=3.88) and lack of training ($\bar{x}$=3.82). Poor internet and heavy workload are also strongly agreed upon as significant barriers.

Testing Of Hypotheses

Hypothesis One (H_{01}): There is no significant relationship between Biology teachers' perceptions of digital tools and their reported competency in using them.

Table 5: Pearson Correlation Analysis for Hypothesis One

Variables	N	Mean Perception	Mean Competency	r-cal	p-value	Decision
Perception & Competency	85	3.58	2.23	0.402**	0.000	H_{01} Rejected

**p < .01

The result in Table 5 shows a calculated Pearson correlation coefficient (r) of 0.402 with a p-value of 0.000, which is less than the 0.05 significance level. This indicates a statistically significant positive correlation between teachers' perceptions and their self-reported competency. Therefore, the null hypothesis is rejected. This means that in this sample, teachers with more positive perceptions of digital tools also tend to report higher competency levels, and vice-versa.

Hypothesis Two (H_{02}): There is no significant influence of the availability of digital tools on teachers' frequency of use in Biology instruction.

Table 6: Simple Linear Regression Analysis for Hypothesis Two

Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error**	**F-statistic**	**p-value**
1	.521	.271	.262	.841	30.874	.000*
*Predictor: (Constant), Availability Index. Dependent Variable: Frequency of Use Score.						

The regression analysis in Table 6 shows that the model is significant ($F(1, 83) = 30.874$, $p = .000$). The R-squared value of 0.271 indicates that about 27.1% of the variance in teachers' frequency of using digital tools can be explained by the availability of those tools. Since the p-value is less than 0.05, the null hypothesis is rejected. This means there is a statistically significant influence of tool availability on how often teachers use them. More availability leads to more frequent use.

Discussion Of Findings

The findings of this study paint a clear picture of the state of digital integration for Biology teaching in Ikwerre LGA. First, the study found that Biology teachers have very positive perceptions about the usefulness of digital tools. They strongly believe that these tools make lessons more engaging and help explain complex concepts. This aligns with global research that highlights teacher recognition of technology's pedagogical value (Buabeng-Andoh, 2021). It is a promising foundation upon which to build.

However, the second major finding reveals a critical gap: teachers' self-reported competencies are low. While they see the value, they do not feel skilled enough to effectively use many tools, especially interactive ones like simulation software. This finding is consistent with Agyei's (2022) work in Ghana, which identified a significant skills deficit among teachers. The low competency in using a projector is particularly telling, as it is a basic tool for displaying digital content. This gap

between perception ("it's good") and competency ("I can't do it well") is the central dilemma uncovered by this study.

The third finding explains part of this gap: a severe lack of available and accessible digital tools. While computer labs exist, personal or classroom-specific access is minimal. Teachers heavily depend on their personal smartphones. The near-total absence of stable internet and projectors severely limits what can be done in the classroom. You cannot use an online simulation if there is no internet. You cannot show a presentation to the whole class without a projector. This finding echoes the infrastructural challenges documented by Ifinedo (2020) across rural Nigeria.

The fourth finding solidifies the explanation. Teachers identified monumental challenges. Unstable electricity was the number one barrier, making any reliance on technology risky. Lack of training was also highlighted, confirming that the competency gap is linked to insufficient professional development. These challenges create a vicious cycle: no tools and no training lead to low competency and infrequent use, which reinforces the perception that using technology is too difficult.

The hypothesis tests added statistical depth. The positive correlation between perception and competency suggests that improving one might positively affect the other. For instance, effective training (boosting competency) could further enhance positive perceptions by reducing anxiety. More strikingly, the regression analysis confirmed that availability directly influences use. This is a powerful argument for resource provision. You cannot expect integration if the tools are not there.

In summary, Biology teachers in Ikwerre are willing but unable. They are caught between a digital future and a challenging present marked by power cuts, scarce tools, and inadequate training. This situation undoubtedly affects the quality of Biology instruction and student learning experiences.

Conclusion

In conclusion, this study has shown that Biology teachers in senior secondary schools in Ikwerre LGA perceive digital tools as highly useful for instruction. They believe in the power of technology to make Biology more understandable and engaging for their students. However, this positive mindset is not matched by their skill level. Teachers report low competency in using even basic digital tools for teaching. This competency gap is exacerbated by a severe shortage of accessible tools, chronic electricity problems, and a lack of training opportunities.

The situation presents a clear call to action. There is a strong will among teachers, but the way is blocked by significant barriers. Without intervention, the potential of digital tools to transform Biology education in Ikwerre will remain untapped. Addressing this requires a coordinated effort targeting infrastructure, resource provision, and, most importantly, teacher capacity building.

Recommendations

Based on the findings, the following recommendations are made:

1. The Rivers State Ministry of Education, in partnership with NGOs and tech companies, should organize regular, hands-on workshops for Biology teachers in Ikwerre. Training should focus on practical skills: creating simple presentations, using projectors, accessing offline educational videos, and utilizing free simulation software. Training should be ongoing, not a one-time event.
2. Each senior secondary school in Ikwerre should be equipped with a "Biology Digital Kit." This should include a durable laptop, a portable LCD projector with a power bank or inverter backup, and a hard drive loaded with offline Biology resources (videos, simulations, images). This makes tools accessible directly to the Biology department.
3. The government should prioritize providing stable electricity to schools. Solutions could include solar power installations specifically for the computer lab and staff rooms. Where possible, efforts should be made to provide limited, stable internet connectivity, at least for teachers to download resources periodically.
4. Schools should encourage the formation of digital champions or peer-teacher support groups. Teachers who are more competent can mentor others. This creates a sustainable, low-cost community of practice for sharing tips and solving problems locally.
5. The school curriculum and scheme of work for Biology should explicitly suggest digital tools or resources for specific topics. This guides teachers and makes digital integration a formal part of lesson planning, not an optional add-on.

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PART THREE

Catalysts of Change – Transforming Skills, Business, and Economy for Tomorrow

> *"For Nigeria to harness its fullest economic potential, our education system must empower every learner with real world skills, entrepreneurial mindset and a commitment to innovation. It is through skills driven learning, not mere certificates, that we will transform our workforce, fuel business growth and build an economy that works for all."*
>
> ***Kingsley Moghalu***

Part Three, "Catalysts of Change – Transforming Skills, Business, and Economy for Tomorrow," delves into the critical intersection of education, entrepreneurship, and economic development in Nigeria and beyond. In today's rapidly evolving global landscape, traditional knowledge alone is no longer sufficient to drive progress. The demands of the 21st-century economy require learners who are not only knowledgeable but also skilled, innovative, and equipped with an entrepreneurial mindset. This section explores how Business Education, Technical Education, and Vocational Training serve as powerful engines of transformation. It examines emerging trends, innovative strategies, and practical pathways through which education can ignite economic growth, nurture talent, and shape resilient, future-ready societies. Inspired by the words of Professor Kingsley Moghalu, we recognize that skills-driven learning is the true catalyst for change, enabling individuals to contribute meaningfully to the workforce, create thriving businesses, and ultimately build an economy that works for everyone. As we journey through this part, we uncover insights that challenge conventional approaches, highlight opportunities for reform, and inspire bold action—reminding us that education is not merely preparation for life, but a force that transforms lives, communities, and nations.

I have the privilege of working closely with Professor Okwelle throughout his eventful tenure. He brought finesse and candour to the administration of the

Commission and the colleges. At the time he took over, the Commission was a shadow of its glorious past. He quickly embarked on some transformative agenda that resuscitated the Commission from slumber. He succeeded in putting the Commission back to enviable position by ensuring its visibility at different fora. The Commission suddenly became a beautiful bride under his leadership.

Lawrence Babatunde Aremu

Chapter 9

Application Of Vocational Marketing Skills for Students' Human Capacity Building in Polytechnic Education

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Abstract

There can never be national development without vocational skills required by students at all level of education especially at the Polytechnic level. The importance and need for vocational education of the students can never be overemphasized; therefore, there is the need and awareness of marketing these philosophies and ideas for students' skills capacity building for national development. The study is therefore posies to investigate ***the*** *application of vocational marketing skills for students' human capacity building in polytechnic education. The study x-rayed the concepts of vocational marketing skills, human capacity building as well the objectives of polytechnic education. The practical skills required for students' vocational marketing capacity building were highlighted as well as the strategies for building vocational marketing skills for students' capacity development were not left untouched. It was concluded that vocational marketing skills for students' capacity building requires students to acquires these skills to manage human and material resources of their own business through such skills and competencies in areas of vocational education. It was therefore recommended that; lecturers in the Polytechnic sector should engage themselves in personal/private programmes and training for practical skills acquisition, federal and state governments should only employ certified and qualified teachers and vocational experts into the Polytechnic sector to avoid quarks and interlopers in the sector, and that school authorities as well as teachers in the Polytechnic sector should conduct and organize*

symposiums, workshops and conferences to enable the students gain the prerequisite knowledge, skills, ideas and good work attitudes for the world of work.

Keywords: *Vocational marketing skills, human capacity building, and polytechnic education*

Introduction

Nigeria is one of the richest countries with vast mineral, agricultural and human resources which have been untapped due to high number of unskilled manpower produced by the educational system. Thus, if the students acquire such skills, it will assist in no small measure for national sustainable development. As a matter of fact, several policies and theories have been formulated with a view to sustaining the vocational and entrepreneurial skills of the students to enhance business operations and economic advancement. But situation in the country seems to portray that these policies and theories are yet to be put into practice.

Vocational education is that branch of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge. It is an educational programme and process that prepare the students to acquire more practical skills than theories for the world of work. The importance and need for vocational education of the students can never be overemphasized; therefore, there is the need and awareness of marketing these philosophies and ideas for students' skills capacity building for national development.

There can never be national development without vocational skills required by students at all level of education especially at the Polytechnic level. National development will make much meaning, if "national" is explained. National is derived from the root word 'nation" and it denotes "a collection of people bound together by cultural factors, sharing values and traditions, a common language, religion, history and occupying the same geographical area (Enyekit, 2017). It could also be **referred to the ability of a nation to improve the lives of its citizens.** The State and the Nation are two words always used interchangeably though different in meaning. According to Oluwatoyin (2011) in Ashay., Markin., and Horsfall, (2016) national growth is described as the overall development or a collection of socio-economic, political as well as religious advancement of a country or nation. However, it could be seen as national development to be an exploitation and utilization of both human and material resources to improve the lots of a nation. Nevertheless, national development is a minimum socio and political development as well as economic development in the building of a national identity. This relates to the ability of a

country to improve the social welfare of the people by providing social amenities such as water, good roads, access to health facilities etc.

Also, national development like development has varied meaning and perspective. To qualify as national development such development must affect the nation in all ramifications; economic, social, political, cultural and other human endeavour one can think of. According to Ugwu (2006) in Enyekit and Omodu (2022), noted that national development connotes the ability of a state to provide a source of living for the majority of its inhabitants and elimination of poverty, provision of adequate welfare, shelter, ad clothing's to its citizens. National development differs from national growth which implies increase in a country productive capacity as measured by the Gross Domestic Product (GDP). National development involves economic growth, modernization, equitable distribution of income and national resources and socio-economic transformation for improved living standards of people through the use of a country's human national and institutional resources. The implication of the provision would be socioeconomic growth, social justice, and positive changes in social relationship, intergovernmental relationship, popular participation in politics and overall restructuring and transformation of the society.

Conceptual Framework

The concept of marketing has been in process and will continually be viewed by different persons in different ways. According to America Marketing Association in Babalola (2015), in Enyekit (2017) noted that marketing is described as the activity, set of institutions, and processes for creating communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large. From the foregoing, marketing could be described to mean the process of promoting and selling products or services. On the other hand, the concept of marketing at the social perspective, marketing has been viewed to mean a societal process by which individuals and groups obtain what they need and want through creating, offering and freely exchanging products and services of value with others.

In a related view, Umanah in Benjamine (2018) explained the concept of marketing to be the performance of business activities that direct the flow of goods and services from the producers to the consumers or users. From the views of the different authors on the meaning of marketing, it has shown that marketing has grown and shifted from simple and mere exchange of goods for goods or services to services to full system interacting business activities designed to plan, price, promote and distribute wants that satisfy the needs of the customers at a given time and period.

The principle of modern marketing is therefore anchored on exchange of goods and services, whereby marketing creates the exchange process through the performance of both selling, buying, transportation, financing, risk taking storing, quality assurance, and obtaining of the needed marketing information for the satisfaction of

the parties involved in the marketing process. Hitherto, the concept of marketing as viewed in this study could be described to be the process of organizations and individual interaction in exchanging goods, services and ideas that have values and satisfaction from the producers to the customers at a given price and at a given period. Thus, the above definitions do not only broaden the scope and range of activities and processes that could be considered as parts of marketing, but also place more stronger emphasis on the opposite end on the exchange of only the customers.

Vocational marketing is the process of selling and promoting the products and services of an organization or individual for the purpose of getting the satisfaction of the consumers. Furthermore, it be the application of all marketing activities; modern marketing is therefore anchored on exchange of goods and services, whereby vocational marketing creates the exchange process through the performance of both selling, buying, transportation, financing, risk taking storing, quality assurance, and obtaining of the needed marketing information for the satisfaction of the parties involved in the marketing process

The history of polytechnics in Nigeria was the establishment of Yaba College of Technology in 1948, Institute of Management and Technology (IMT) and Kaduna Polytechnic in 1958 by the Federal Government. Between 1963 and 1979, 22 polytechnics had been established in the country and by 2008, the number had risen to 65, made up of 21 Federally- owned, 32 state-owned and 12 private ones. According to Seng, (2007) in Enyekit (2017) noted that by 2012, there were 125 polytechnics in the country have increased due to the quest and approvals for the establishment of private polytechnics, the number may certainly have gone up. Added to this, are many universities of technology and EIES.

Polytechnic education is deemed as that which offers opportunity for "hands on experience" within dynamic and progressive learning setting; with strong emphasis on practice-based learning as against the philosophical base of the University. It involves work attachment with industries (Industrial Training IT/Students Industrial Work Experience Scheme SIWES programmes) as part of the curriculum. It therefore implies that quantity does not matter as much as quality, in bringing about the desired results in polytechnic education.

Objective of Polytechnic Education

The Federal Polytechnic Act, (1997) in Enyekit and Enyekit (2021) enunciates the mandate and functions of polytechnics, which include:

1. To provide full-time and part-time courses of instruction and training:

(a) in technology, applied science, commerce and management, and
(b) in such other fields of applied learning relevant to the needs of the development of Nigeria in the areas of industrial and agricultural production

and distribution, and of research and to the development and adaptation of techniques as may be dictated by national needs and circumstances.

(2) To arrange conferences, seminars and study groups relative to their areas of mandate. By their mandate, programmes and curricula, therefore, the polytechnics are established to produce middle and high-level manpower embracing scientists, engineers and technologists. Due to their mandate, they have been impacting on the\ development of the nation through:

(3) Manpower generation; Available statistics show that between 1986 and 2003, for example, the polytechnics produced 157, 963 National Diploma graduates and 87, 802 Higher National Diploma graduates in 89 varied disciplines ranging from arts to engineering.

(4) Fabrication of tools (mostly prototypes) and machines for agricultural and industrial uses,

(5) Research and development in areas of national needs ranging from social to economic,

(6) Production of new varieties of food and cash crops, animals, fishes, etc.

(7) Public enlightenment/education through seminars, conferences, etc in areas of national needs.

Theoretical Framework

The Field Experience Approach

This approach according to Obanewe (1983) in Enyekit (2016) is the common practice whereby teacher-trainees are assigned to schools to teach for a specific period. The period varies from six weeks to one year depending the school and programme. The proponent of this theory opined programmes such as Students Industrial Work Experience Scheme (SIWES), and Teaching Practice (TP). The main focus of this theory include; students' skills acquisition through workshop exercise; teachers retraining programmes through conferences, workshops and seminars, teachers' induction and skills development through further studies and improvement course and teachers mentoring for skills development. Empirical study conducted by Enoch; Waterman; Enoch and Phillip (2011) in Enyekit (2016) also adopted the theory in similar scenarios as it showed positive application of the theory in achieving entrepreneurship education and skills development of the teachers and students in the teaching-learning environment. This theory therefore is related to this current study conducted by the researcher because; this present study is also interested in both teachers and students' skill development in teaching and learning of entrepreneurship education.

Practical Skills Required for Students Vocational Marketing Capacity Building

There are practical skills required by students in building vocational marketing capacity for national development. These skills include the followings;

1. **Creativity and Problem-Solving Skills**
   Critical thinking skills, like analytical skills, can be necessary for developing ones overall entrepreneurial skills. Critical thinking skills can also translate into strategic thinking skills. Students who have these skills are likely to built brands and businesses most likely applied their strategic planning skills to develop strategies for growing and developing their businesses. It requires the ability of business education graduates to be able to look at problems, situations, projects and operations from different perspectives that can help in decision-making and problem solving. Critical thinking skills can also be necessary for strategic planning and evaluating the approaches you're using to make changes or improve your business strategies as needed.

2. **Interpersonal Skills**
   According to Enyekit and Ubulom (2022), interpersonal skills are those skills that enable the students to interact with people; between colleagues, subordinates, clients (customers), etc for the common goals and objectives of the business. Interpersonal skills required by students for capacity building is basically on the interactions and relationship between the person and all those things that are used in the performance of their duties aimed at attaining the objectives of the organization.

3. **Leadership Skills**
   Successful entrepreneurs will most often rely on their business skills to manage and run a business or brand. Developing your business management skills can mean building up your ability to multitask, delegate responsibilities to subordinates and making decisions regarding the health and profitability of your business. To be successful in any competitive business environment, one needs to take planning seriously and the ability to be able to think strategically to allow one find ways to beat out your competition, grow your market reach or implement effective strategies to reach your goals. In a bid to become successful in business, students could desire to take leadership training and roles in working as part of a team. To become an entrepreneur demands that one would most likely act or play the roles of a supervisor, part of a team, as well as being able to meet up the need of other employees to enable them rely on effective leadership style that would help to help motivate them for team work.

4. **Website and Innovation Management Skills**

The students in this age of computer revolution need website and innovation skills to be able to fit into the business world. Website skills and awareness enable the students to search information online and relate with their customers and clients. Baker (2002) in Harry and Odiphri (2022) noted that the primary drivers of innovation include financial pressures to decrease costs and increase efficiency, increase competition, shorter product life cycles, value migration, stricter regulations, industry and community needs for sustainable development, etc. No matter the industry you venture into as an entrepreneur, you may still need to develop effective customer service skills. From talking with potential clients to discussing opening partnerships, effective customer service skills can help you connect with your customer base and ensure your brand is providing the products or services your market needs.

5. **Effective Communication Skills**

The channel or means of transferring ideas, knowledge between the teacher and the learners is done through effective communication. According to Obi (2001) in Enyekit (2017) communication is referred to as symbols and signs which could oral or written speech, gestures, rites, ceremonies, monuments, documents or products of fine art, which have assigned meanings. For students to be able to sell their vocational marketing skills, it is expected that there should be effective communication that would lead to the passing of information or message through a medium from the sender to the receiver with the possibility of getting feedback. From the views of the authors, communication could be said to be a means or channel of passing ideas, knowledge, and thoughts through the use of symbols, machines, code, graphics, signs and arts with the intent of getting feedback from the receiver.

Strategies for Building Vocational Marketing Skills for Students Capacity Development

According to Markeen and Aswal (2021), strategies are ways and manners of solving problems inherent in a matter. Strategies focused on the ways of getting things done for the purpose of achieving the needed results. In view of the above, strategies could be deduced to mean, approaches, methods and procedures for getting done in solving a problem in a phenomenon. There are different strategies for building vocational marketing skills for students' capacity development. Hitherto, Enyekit (2021) identified the followings as strategies for building vocational marketing skills for students' capacity development;

1. **Conferences and Workshops Certifications**
   Conferences and workshops are some of the strategies that are used in training and getting the students to build up their vocational marketing capacity for self-reliant. Through these approaches and forum, students are exposed to obtain occupational firsthand information from specialists in the industry for career growth and development.

2. **Practical Work Experiences**
   Practical work experience is another good strategy and method for vocational marketing skill for students' capacity building. The students should be attached to specialized firms that would build their skills in their different areas of interest; in this case, they are involved in the jobs and are therefore exposed to the work, attitudes as well as hazard of the profession and occupation (Enyekit & Ubulom, 2020). Also related to the practical experience activity is the introduction and application of the Students' Industrial Work Experience Scheme (SIWES) that allows students at higher institutions of learning to carry-out this exercise for some months to gain practical knowledge of the vocation. This programme also serves as platform for students to acquire the vocational marketing skills in their different endeavors in capacity building.

3. **Upgrading Higher Education**
   Higher education in Nigeria is the education given after secondary education in universities, polytechnics, monotechnics, and colleges of education among others with the aim of developing students with relevant knowledge, skills, understanding and sound reasoning to enable them contribute to the development of the society (Enyekit & Ukata, 2022). Students in polytechnic education system are exposed to the different vocational marketing skills to develop themselves; thus, this paved ways for the Federal government to place premium on education as a means of preparing the youths for the world of work (FRN, 2013)

4. **Mentor-Mentee Relationship Method**
   Mentor and mentee relationship is another strategy that could be adopted to get the capacity building of the students in vocational marketing. Mentoring is associated with as invaluable training programme that exposed the mentees (students) to necessary knowledge and skills in their different vocation and career. Therefore, if the relationships between the mentors and mentees are not well established, there could be negative results such as low confidence, low productivity, and lack of skills as well as retardation as expected of the students.

Conclusion

It is important to note that vocational marketing skills for students' capacity building requires students to acquires these skills to manage human and material resources of their own business through such skills and competencies in areas of vocational education. It is on this premise that vocational education creates the enablement for resources utilization and economic expansion for national development, reduction of poverty and enhancement of standard of living of the people in a country.

Suggestions

Based on the issues raised and discussed in the study thereof, the following suggestions

were made;

1. Lectures in the Polytechnic sector should engage themselves in personal/private programmes and training for practical skills acquisition.
2. Federal and state governments should only employ certified and qualified teachers and vocational experts into the Polytechnic sector to avoid quarks and interlopers in the sector.
3. School authorities as well as teachers in the Polytechnic sector should conduct and organize symposiums, workshops and conferences to enable the students gain the prerequisite knowledge, skills, ideas and good work attitudes for the world of work.

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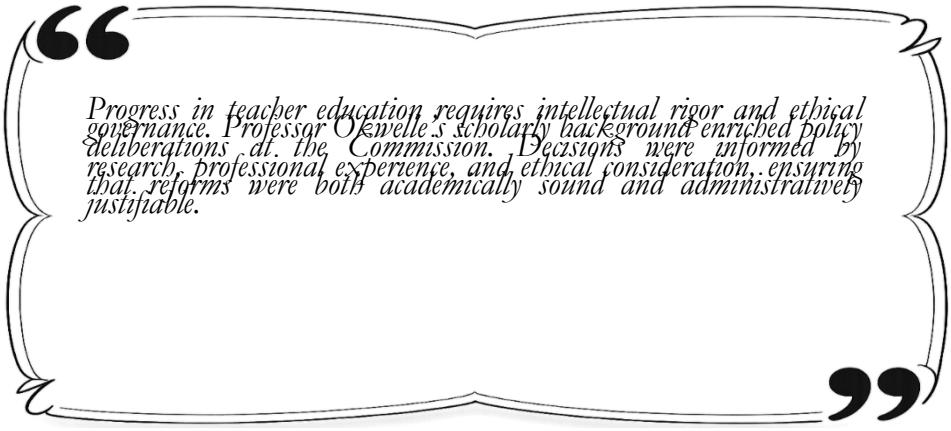
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Chapter 10

Contemporary Issues in Technical Education

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Abstract

Technical education in Nigeria serves as a formal alternative to the informal apprenticeship system, providing structured, school-based training in various technological fields. Unlike traditional apprenticeship, technical education is institutionalized, offering students practical skills and theoretical knowledge across disciplines such as automobile, building, electrical/electronic, metalwork, and woodwork technology. Over the years, it has contributed significantly to national manpower development, producing skilled employees, entrepreneurs, and educators who advance technological knowledge and practice. Despite these contributions, technical education faces numerous contemporary challenges, including misalignment with industry needs, a widening skills gap, limited integration of emerging technologies, negative societal perceptions, inadequate funding, and weak school-industry partnerships. These challenges hinder graduate employability, reduce student engagement, and constrain national technological development. This paper critically examines the definition, origin, aims, philosophy, and programme offerings of technical education in Nigeria, identifies contemporary issues affecting its effectiveness, and proposes potential solutions. Key recommendations include curriculum innovation, work-based learning, upskilling and reskilling of lecturers, enhanced promotion of technical education, increased funding, and strengthened school-industry collaborations. Addressing these challenges is crucial for ensuring that technical education continues to meet industry demands, foster innovation, and contribute meaningfully to national development.

Keywords: *Technical Education, Skills Gap, Emerging Technologies, School-Industry Partnership, Curriculum Innovation, Nigeria*

Introduction

Technical education programme is an alternative platform to informal apprenticeship programme that was earlier practiced in Nigeria. An informal apprenticeship programme is a type of work based training that provides individuals with practical experience and skills in a specific trade or occupation without a formal structure or certification. This programme is characterized by: working with family member or friend, learning by doing, no formal agreement, no standardized curriculum and no certification.

Because of the informal nature of apprenticeship programme, technical education was introduced. Unlike apprenticeship programme that involved a trainee and a trainer, who were a times related, technical education programme is done in a school settings and it involves students (who are trainees) and lecturers (who are trainers). Technical education is offered in colleges of education, polytechnics and federal/state Universities. It is aimed at providing different skills, such as automobile technology education, building technology education, electrical/electronic technology education, metal work technology education and wood work technology education to so many persons at once.

Over the years, technical education has trained several manpower who are currently serving in different technology endeavours. The programme has also trained entrepreneurs who are doing very well in the private sector that have provided job opportunities for unemployed thereby contributing to the reduction of insecurity in Nigeria. In addition to trained employed and self employed persons in the Nigeria, technical education has also trained technology teachers who are doing very well in the educational sector by providing the needed technology knowledge and skill for transfer of knowledge and the sustenance of technology in Nigeria.

Meanwhile, technical education is battling with so many challenges. Some of these challenges had been in existence for a very long period while some are contemporary challenges due to the innovations that have taken place in the technology sector. However, if these challenges are not identified and mitigated, they could have major negative impact on the implementation of technical education which will have a repel effect on the technology development of Nigeria. Consequently, this literature will highlight the definition of technical education, origin of technical education, aims and philosophy of technical education, programmes offered in technical education, contemporary issues in technical education and potential solutions to contemporary issues in technical education.

Definition of Technical Education

Technical education is the comprehensive term referring to those aspects of educational processes involving the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to

occupations in various sectors of economic and social life. Technical education is any education programme with the responsibility to orient people into skills acquisition, and as well as to teach them attitude and knowledge necessary for the appropriate utilization of such skills. Also, technical education can be defined as a formal programme that provides opportunities for individuals to be fully equipped with either automobile, building, metal work, electrical/electronic or woodwork skills for employment or self employment in addition to teaching skills necessary for impacting knowledge, skills and competencies relating to technology.

Origin of Technical Education

The origin of technical education could be traced to the traditional education practice in the pre-colonial era. During the pre-colonial era, the child was trained in the family trade through direct apprenticeship by either parents or relations. Skills acquisition was regarded as an informal one, whereby the learner lives with his master throughout the period of training. The approach of skills acquisition was based on observation and imitation of the master.

Then, the trainee was taught various skills which include; weaving, sculpture, blacksmithing, carving, farming, fishing, cattle rearing, hair platting, dress making, bead making, leatherwork, pottery, brick making, basket weaving, raffia works, mat weaving and others. The duration of training was three to seven years based on the trade the apprentice was specialised in, the skills possessed by the trainer, his level of competence and exposure, and the trainee's ability to perform. Upon completion of the training, the trainer provides the equipment and tools to set up the trainee. During this period, technical education was not given the needed recognition.

During colonial era, missionaries started building schools for the purpose of evangelism. This period was characterised by a type of educational system which was focussed on winning souls and also producing clerks and interpreters for missionaries. However, between 1930 and 1960, government became more active in the implementation of technical education. Regional governments set up technical educations in different years in their regions, such as Enugu, Kano, Bukuru, Sapele, Ijebu-Ode, Osogbo, Oyo, Owo, Aba and Abakaliki.

More so, in 1997, the federal government of Nigeria issued the first National Policy on Education. This policy contributed immensely to the development of technical education in the country. To further strengthen technical education, Nigeria government also set up agencies of quality assurance. These agencies include: National Commission for Colleges of Education (NCCE), the National Board for Technical Education (NBTE) and the National University Commission (NUC). Today, several technical institutions have been established in Nigeria to award Nigerian Certificate in Education (NCE) technical and in other vocational fields. In addition, few conventional colleges of education and polytechnics have departments

of technical education to produce NCE (technical) graduates too. Some federal and state universities of technology have also been established across the country to offer technical education.

Aims and Philosophy of Technical Education

Technical education is an educational programme that is designed to empower individuals with different skills. It is designed with the aim of bridging skills gap created by formal education whereby graduates are produced without the requisite skills for employment. The aims and objectives of technical education include:

- To provide courses of instruction and training in engineering, other technologies, applied sciences, business and management, leading to the production of trained manpower.
- To provide the technical knowledge and skills necessary for agricultural, industrial, commercial and economic development of Nigeria.
- To give training that imparts the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self-reliant.
- To train people who can apply scientific knowledge to solve environment problems for the convenience of man, and
- To give exposure on professional studies in the technologies.

The philosophy of technical education includes:

- The choice of occupation should be based on the orientation of an individual on interest, attitude and ability and so on.
- All honest occupations should be considered in terms of making life decision about work.
- Each individual should have the opportunity to select an occupation based on his orientation and the prospects for employment in that occupation.
- Resources for education must be provided to develop all human resources etc.

Programs offered in Technical Education

There are five major programmes in technical education. These programmes include Automobile technology education, Building technology education, Electrical/Electronic technology education, Metal works technology education and Wood work technology education.

A. Automobile Technology Education

Automobile Technology Education is an educational programme that involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of automobiles. Automobile Technology Education is also known as a programme designed for the training of individuals in tertiary institutions who can repair or assemble automobile either as an employee or an employer. It can also be considered as a sub-unit of the Department of Industrial Technical Education, offered in the Faculty of Vocational and Technical Education and structured to prepare students for the 21st century workplaces in automobile related industries.

The main aim of automobile technology education is to provide high-level skilled graduates who will be facilitators of automobile education in tertiary institutions, entrepreneurs in automobile trades and or gain employment in automobile related institutions.

B. Building Technology Education

Building technology is a course offered in technical colleges and Universities with the aim of producing skilled personnel who will be able to perform basic functions in building industries both in private and public sector. It can also be defined as the study of technical and practical skills required to design, construct and maintain buildings and other structures.

The goal of building technology education is to equip students with technical skills and knowledge, prepare students for career in construction and built environment and foster problem-solving and critical thinking provide.

C. Electrical/electronic Technology Education

Electrical/Electronic Technology Education is an aspect of technical education programme offered in tertiary institutions such as University, Polytechnic and Colleges of Education with an aim of producing electrical and electronic technologists, technicians and teachers. Electrical and Electronics technology education is a specialized type of education that is focused on the acquisition of skills needed in the workplace with a special focus on electrical and electronic technology.

The main goal of Electrical/Electronic Technology Education programme is to produce competent electrical/electronic technicians with sound theoretical knowledge, who should be able to perform all types of electrical installation, diagnose, and perform repairs and/or maintenance on electrical and electronic devices.

D. Metalwork Technology Education

Metalwork technology is an aspect of technology education that is geared towards leading an individual towards the attainment of practical and applied proficiencies, alongside fundamental scientific comprehension in the realm of metalwork. It can also be defined as the study of skills and techniques needed in the production and utilization of metal for technological purposes. The main aim of metal work technology education is to equip individuals with the knowledge, skills and competencies required to work in metal work industries or for establishment of metal work related enterprises.

E. Woodwork Technology Education

Wood work technology education is the application of scientific knowledge and skill in the design, selection of materials, construction, assembling and fastening two or more pieces of wood together. Wood work technology education is an area of specialization that involves the acquisition of knowledge, skills and attitude in the manipulation, construction or fabrication of wood work parts in the workshop. It is the study of skills and techniques used to work with wood and wood products. The aim of woodwork technology education is to equip individuals with the knowledge, skills and competencies required to work with wood and wood products.

Contemporary issues in Technical Education

The word contemporary connotes modern or current. Therefore, contemporary issues in technical education can be defined as modern or current troubling situations in technical education. There are so many challenges bedeviling technical education but for the sake of this study, relevance and alignment with industry, skills gap, integration of emerging technologies, negative perception towards technical education, funding and resource constraints and school/industry partnership will be discussed as contemporary issues in technical education.

- Relevance and Alignment with Industry Needs

This is one of the contemporary issues confronting technical education. It refers to the extent to which technical education curriculum relates to what is required by industries, especially modern industries. Meanwhile, due to innovations in technology sector, industries are in dire need of modern skills which guides their employment process.

Consequently, for technical education to remain relevant, technical education curriculum is expected to be innovated regularly to integrate new skills in modern industries so that graduates can easily secure employment. Unfortunately, it is observed that technical education often struggles to keep pace with the rapidly

changing needs of industries. The implication is that students graduate without acquisition of modern skills that will position them for employment in industries.

- Skills Gap

Skill gap is a mismatch between skills competencies that technical students acquire during their education and training, and the skills and competencies that employers require in the workforce. In other words, it is the gap between what students learn in technical schools and what they need to know to perform effectively in their chosen occupation. Also, it can be defined as the gap/difference between acquired and required skills.

However, with numerous innovations in technology world today, industries are shifting from manual to automated and some are adopting robots and other artificial intelligence medium in their operations. Meanwhile, some of these innovations are yet to be integrated into the curriculum of technical education, such technical students may graduate without acquiring skills related to some of these innovation, thereby creating skill gap since such skills are required in modern industries. This is why technical education graduates lack the practical skills and competencies required by employers in modern industries. This has led to a growing skills gap, where employers are unable to find workers with the right skills to fill vacant positions.

Skills Gaps in Technical Education

1. Artificial intelligence
2. Robotic and automation
3. CNC machining
4. Mechatronics
5. Digital

Causes of Skills Gap in Technical Education

The following are some of the causes of skills gap in technical education:

1. Non alignment of technical education curriculum with industry needs
2. Insufficient skills training opportunities
3. Technology advancement
4. Inadequate training of lecturers.

Effects of Skills Gap in Technical Education

1. Unemployment of technical education graduates
2. Underemployment of technical education graduates
3. Apathy towards technical education
4. Low enrolment

Solutions

1. School/industry partnership
2. Curriculum review and update
3. Training of lecturers on modern skills
4. Regular skills acquisition programmes
5. Provision of modern equipment
6. Reorientation of students

- Integration of Emerging Technologies

Emerging technologies are innovative technologies that are in the early stage of development or introduction with the potential of significantly impacting various industries, societies and individuals. Similarly, emerging technologies are technologies that are still in their infancy yet have the potential to revolutionize how we live and solve some of the world's most serious issues. Emerging technologies are most times characterized by rapid advancements, improved performance and increased accessibility.

Emerging Technologies in Technical Education

1. Additive manufacturing
2. Internet of things
3. Artificial intelligence
4. Augmented and virtual reality
5. Robotics and automation
6. Blockchain
7. Nanotechnology
8. 5D and Edge computing

Impact of Emerging Technologies in Technical Education

The following are some impacts of emerging technologies in technical education:

1. Improved accuracy
2. Increased efficiency
3. Enhanced safety
4. Time effectiveness

The increasing use of emerging technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT) has created a challenge for technical education providers to integrate these technologies into their curricula. Below are some challenges militating the integration of emerging technologies in Technical Education:

1. Infrastructure deficit
2. Inadequate internet connectivity

3. Cost of purchasing emerging technologies
4. Limited funding
5. Inadequate number of skilled personnel
6. Lack of awareness
7. Inadequate policy framework
8. Resistant to change

- Negative Perception towards Technical Education:

This refers to the unfavorable views, attitude and beliefs that individual, communities and societies hold about technical education which directly or indirectly affects their choices, interest and likeness for technical education. Technical education in Nigeria has gone through a serious "look down" and public rejection in the past and present. Most parents prefer to train their wards in professional courses like medicine, engineering, medical laboratory, law and accounting since Technical education courses are regarded for those who are not academically sound and cannot gain admission into other disciplines where higher grades are required. Some people perceive technical education programmes as educational programme meant for never do well students or drop-outs. There is also belief that technical education degrees are regarded as inferior compared to other professional degrees.

Due to the negative perception towards Technical education, students have no confidence that the institution could bring success into their futures. This is one contemporary issue in technical education that requires urgent attention. Below are some of the factors responsible for negative perception towards technical education:

1. Lack of awareness
2. Inadequate funding
3. Employer bias
4. Lack of industry partnership
5. Outdated curriculum
6. Poor infrastructure and resources
7. Limited job opportunities
8. Perceived low earning

Implications of Negative Perception towards Technical Education

1. Low enrolment
2. Poor academic performance
3. Students lack of interest
4. Unemployment of technical education graduates

Possible Solutions to Negative Perception towards Technical Education

1. Promoting technical education
2. Improving infrastructure and resources

3. Developing school/industry partnership
4. Updating technical education curriculum
5. Providing incentives, such as scholarship to students

- Funding and Resource Constraints

Universities in Nigeria are owed and financially sustained by federal or state governments or private individuals. It then means that universities depend on the allocation released to them by governments for their operations. In Nigeria, the allocation to education is below the benchmark for running an effective educational system. This is evident in the 2025 Nigerian budget that allocated 7.08% to education which falls short of the 20% recommended by UNESCO.

Meanwhile, researchers believe that when educational sector is not properly funded, necessary school facilities cannot be acquired coupled with so many challenges that will confront educational programmes. Therefore, it could be right to say that the inability or unwillingness of government to provide enough fund for the running of educational porgrammes has made Technical education uninteresting thereby losing public confidence and support. However, below are some of the implications of poor funding of technical education:

1. Shortage of teachers
2. Brain drain
3. Skill gap amongst students
4. Limited access to quality education
5. Lack of innovation
6. Outdated skills
7. Dilapidated infrastructure
8. Lack of equipment and technology

- School/Industry Partnership

School/industry partnership is the collaboration between formal education and industry to create enabling environment for students to acquire hand-on-experience, knowledge, skills and appropriate attitude to work. This is aimed at improving technical education, addressing workforce needs, fostering innovation and promoting economic growth. Therefore, Technical education providers must collaborate with industry partners, community organizations, and other stakeholders to ensure that programs are relevant, effective, and meet the needs of the labor market. Areas of School/Industry Partnership

The following are areas of school/industry partnerships:

1. Mentorship programmes
2. Student Industrial Work Experience Scheme (SIWES)
3. Research collaboration

4. Work based learning
5. Internship programme
6. Expert teaching
7. Organizing workshop
8. Employment
9. Curriculum development

Benefits of School/Industry Partnership

1. Updating of curriculum
2. Practical exposure
3. Resource sharing
4. Networking opportunities
5. Real world application
6. Access to industry expertise
7. Increased student engagement
8. Improved job prospect

Despite the significance of school/industry partnership, technical education institutions are accused of not having robust partnership with industries, apart from the area of Student Industrial Work Experience Scheme (SIWES). This has now become an issue that is seeking urgent attention in technical education.

Potential solutions to Contemporary issues in Technical Education

- Innovation of technical education curriculum

As explained earlier, technical education curriculum is supposed to correlate with industry needs for technical education students to be employable after graduation. But with the issue of technical education curriculum lacking some innovative skills, it is expedient for technical education curriculum to be innovated. Therefore, one of the solutions for contemporary issues in technical education is to innovate technical education curriculum to accommodate modern industrial skills. To achieve this, management of technical education should collaborate with industry partners to develop curricula that meet their needs.

- Work-based learning

This is a learning situation whereby students are exposed to work environment to acquire skills needed in industries. The aim is for students to have work experience about the things taught in the classroom. Work-based learning in technical education include internships and apprenticeships. Work based learning is necessary in technical education to help proffer solutions to contemporary issues in technical education.

- Upskilling and reskilling

Upskilling is the process of learning new skill(s) in order to be proficient in one's current job or venture. More so, upskilling can be defined as the process of learning new skills to advance in one's current role. On the other hand, reskilling refers to the process of acquiring new skills in order to be proficient in another job. Simply put, reskilling means learning new skills for a different role. Therefore, when someone upskills, he/she enhances his/her skills in his/her current career field and when someone reskills, he/she acquires skills for new areas or career fields. Therefore, in solving the problem of lack of innovative skills amongst lecturers in technical education, technical education management should upskill and reskill lecturers to be fully equipped with modern skills that will be transferred to technical education students.

- Promoting technical education

Over the years, technical education has contributed immensely towards human and national development. It is one of the programmes that have contributed in technology development in the country. Irrespective of this, technical education has not been given the needed recognition as people still believe that technical education is meant for never do well students and therefore place below professional programmes like engineering, law, accounting amongst others. However, to remedy this problem, there is need to promote technical education by creating awareness and correcting the negative impression about technical education.

- Increased funding and investment

Effective implementation of technical education requires fund especially for the purchase of equipment. However, it is believed that technical education is underfunded which affects the implementation of technical education. On this premise, solving contemporary issues in technical education requires adequate funding. This funding could come from governments, Non-Governmental Organizations, individuals, Alumni association, and industry partnership amongst others.

- Partnerships and collaborations

From the foregoing, it is believed that school/industry partnership is necessary for effective implementation of technical education. Therefore, management of technical education should partner with industries and other stakeholders, such as community and professional bodies. This will help mitigate contemporary issues in technical education.

Reviewed Questions

1. Define technical education
2. State four objectives of technical education
3. Mention five programmes offered in technical education and define any three
4. Write short note on four contemporary issues in technical education
5. State four potential solutions to contemporary issues in technical education

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Chapter 11

Promoting Business Education Curriculum Implementation in Nigeria Universities: The Place of Teachers' Teaching Experience

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Abstract

This study specifically examined the place of teachers' teaching experience at promoting Business education curriculum implementation in Nigeria universities using Ondo and Ekiti states. One research question and a corresponding hypothesis was formulated and tested. The survey research design was adopted for this study. The population of the study comprised of 72 business education teachers in the states and they were used as the sample for the study. The instrument used was a structured questionnaire which was validated by experts in the field. The test re-test method of reliability was used in ascertaining the reliability of the instrument which yielded a co-efficient of 0.78. The mean, standard deviation and t-test were used in analyzing the data collated and some of the findings include: teachers teaching experience did not significantly influence the curriculum implementation in business education in universities. It was recommended among others, that stakeholders should de-emphasize the idea of experience and consider other variables.

Keywords: *Business Education, Curriculum Implementation, Teaching experience.*

Introduction

Business education is an integral aspect of education whose usefulness has attracted stakeholders both inside and outside academics. Oluwadare, Omidiji & Awe (2022) asserted that the concept of business education has been explained in diverse ways. While some scholars refer to it as commercial education, others see it as both office education and general education. In whatever way we approach it, business education is the subfield of vocational and technical education which prepares the recipient for gainful employment (whether paid or self- employed) through the acquisition of skills, values, competence and knowledge needed to operate in a business world. The process of imparting and acquiring these necessary skills take place in an organized environment. According to Imeokparia and Ediagbonya (2014), Business education is simply described as an aspect of education that is geared at equipping the learners (students) with business and education competencies (that is skills, knowledge and attitude) needed to effectively and efficiently function in the world of work either as an employee or an employer (job/wealth creator). The authors further stressed that Business education is an 'umbrella word' which covers Accounting education, Entrepreneurship education, Marketing education and Office Technology Management education.

Blockhus (1999) claimed that Business education is a sub-set in education which harbours four main disciplines viz: office technology management (secretarial), accounting, entrepreneurship and distributive (marketing) education. Business Education is defined as education for business which prepares the recipients for vocational education for the business majors; for instance, job competency, career preparation, work adjustment and education about business for those who want to acquire general education in the areas of economic efficiency, career exploration and social adjustment.

Since the invention of the Typewriter in 1868, the business education/secretarial education curriculum has gone through tremendous changes. However, these changes did not occur over night. For example, during the period from 1868 to 1971 – over 100 years the traditional equipment and goals remained the same for most business education curriculum, secretarial education inclusive. Not until the early 1980s, when the personal computer and telecommunications dominated office automation has business education been challenged in such drastic changes in its curriculum (Akpotohwo, 2018). The progression of technology in the office technology management (secretarial) education programme has swept through the country in less than 30 years; as the microchip has completely revolutionalised the world. According to Akpotohwo (2018), courses such as typewriting and shorthand are being replaced with electronic mail, desktop publishing, and telecommunication classes. Esene (2016) noted that the inability of business education in Nigeria to cope with the current technological changes taking place in the world of business

education does not make for meaningful business education. According to him, technology changes are responsible for new machines and equipment being constantly introduced in our society. To excel in their business operations, industries also constantly introduce these new machines and equipment in their organizations. The result is that gap is often created between what the schools teach and what the employers want; and this often informed the need to review the curriculum.

A new business education curriculum for universities was developed by the NUC (National Universities Commission) in 1989 and adopted for use of universities country-Wide. The Universities that offer business education do face some challenges in an attempt to provide the desired knowledge, skills and competencies to business Education students as it relates to degree of implementation. This is so because to date, many of the Universities that offer business education do not have adequate, qualified and experienced business education teachers, adequate instructional materials, equipments and facilities needed in business education for the purpose of increased productivity, efficient and effective service delivery. The objectives of the degree awarding (B.sc. Ed/B.Ed) based are:

i. To produce well-qualified and competent graduates in business subjects who will be able to teach business subjects in the secondary schools and other related educational institutions.
ii. To produce graduate teachers who wil be able to inculcate the vocational aspects of business education into the society.
iii. To produce graduate teachers who will be involved in the much desired revolution of vocational development right from the primary and secondary schools.
iv. To equip students with necessary competency so as to qualify them for a postgraduate degree in business education programme with specialization in Accounting, OTM, Marketing and Entrepreneurship.
v. To equip graduates with the right skills that will enable them to engage in a life of work in the office as well as for self-employment (NUC, 1989).

Since the inception of the 2008 NUC business education curriculum, a lot has been written but no study has been done on implementation of this nature and dimension as it relates to the Universities. The 2002, 2008 and 2022 revised minimum standards for Nigerian universities have been found to contain same instructional materials, same academic staff qualification requirements and same teaching methods with the exception of fieldtrip as found in 2008 (4th edition) 6 years later. The two documents were devoid of required evaluation techniques and the needed teachers' experience; hence the researcher will emphasize on the latter in the study.

Oluwadare (2023) and Apata (2023) revealed that teachers qualifications and experience have great influence on students performance because those taught by qualified and experienced teachers performed better than those taught by less

qualified inexperienced teachers. A major variable that can affect or influence curriculum implementation is teachers' years of teaching experience. The relationships between teaching experience and internal efficiency of schools have been examined by many researchers. Ewetan & Ewetan (2015) found out that teachers experience and educational qualifications are the prime predictors of students academic achievement in an item of a test. The experience of a teacher plays a major role in the teaching-learning process. It is sometimes expressed that the productivity of a teacher relies heavily on the teaching experience of the teacher. What the teacher does influence the whole process of learning and qualified teachers produce better performing students through the application of developmental skills (Akiri, 2015).

There have always been recruitment of qualified teachers, underqualified and inexperienced teachers into the teaching profession in both Ondo and Ekiti states as witnessed in the states in Ekiti state in 2023 for both primary and secondary schools and Ondo state in 2024 for only primary schools. To many, teaching became a means to an end, and served only as a stepping stone to greener pasture. The consequence of this was the presence of incompetent teachers in the school system thereby resulting in persistent students failure in public examinations as witnessed in the recently released JAMB Universities Tertiary Matriculation Examination results. This idea of experience may have informed the concept of mentoring in Business education. To become a qualified business Education teacher in Nigeria, it is compulsory for student teachers to go on teaching practice where they will properly be exposed to the nitty-gritty in the profession. The student teacher will be assigned to a more experienced teacher who will teach, guide and direct the student teacher that is less experienced. The more experienced teachers are better informed on classroom management, teaching strategies, test construction, students' assessment and others (Imeokparia, 2015).

Teachers are expected to adhere to the NUC minimum standards in their teaching. It has become necessary to know whether teachers actually follow the NUC minimum standards as planned. The success of the Nigerian universities/ business education will depend to a great extent on the availability of teachers, their quantity and their quality. However, it is generally accepted that the quality of teachers is the largest single determinant of the quality of education (Oluwadare, 2021). Researchers have continued to argue that implementation of programmes depend primarily on what teachers make of them. It is doubtful if the implementation of business education meets these expectations, which are, expecting the teachers to have significant perception of the curriculum, knowledge and understanding of the use of prescribed teaching methods and evaluation techniques. It is expected that teachers teaching experience should influence their implementation roles in the Universities in Ondo and Ekiti states of Nigeria.

Statement of the Problem

The proper implementation of business education curriculum has remained a focal issue in the minds of stakeholders owing to the dynamism in the world today. Udoh (2023) noted a serious gap between the intended changes and actual classroom practices in business education in Universities despite the existence of a common minimum standard for degree programmes. These intended changes some say could be viewed as: teaching styles/method, evaluation techniques, tasks such as field trips, role relationship, instructional materials/equipment and their availability. Commitment to goals/objectives and adherence to teacher-student ratio and class size will lead to the attainment of the objectives. A research report (Aina, 2016) confirmed that there still exists a huge gap between policy and practice in the education industry. Practice, as observed, is almost a complete opposite of stated goals and objectives. Implementation has remained the missing element between elegant government policies and programmes (Okebukola, 2000). These observations suggest that there are problems between the curriculum as documented and the experience at the level of implementation. There is no doubt that the quality of the teacher-trainees is dependent on the professional training received from these universities. The NUC provides the curriculum upon which the universities train their students. There is the need therefore, to determine the veracity and the implementation of the curriculum by the universities in order to determine the quality of teachers produced.

It is a fact that business education instruction in all universities in Nigeria has been based on the NUC curriculum which is being implemented by the teachers throughout the nation. What is not yet fully known is the degree of its implementation in Ondo and Ekiti states of Nigeria. It is observed that non-specialist lecturers teach business courses as against NUC's recommendation. Are teacher-trainers interested in the implementation of the programme and have they seriously imbibed the philosophy or internalized the values of the curriculum? It is questionable whether business education lecturers have the necessary experience to guarantee effective implementation of the curriculum. It is based on the above premise that the study is sought to investigate the influence of teachers' teaching experience on the curriculum implementation of business education in universities in Ondo and Ekiti states, Nigeria.

Purpose of the Study

The purpose of this study is to examine the influence of teachers' teaching experience on the implementation of Business education curriculum. Specifically, the study is sought to:

1. Ascertain whether teachers teaching experience has influenced on their implementation roles in Business education curriculum in Ondo and Ekiti states.

Research Question

The following research question was raised to guide the study:

1. To what extent do teaching experience of Business education teachers influence their implementation roles in business education curriculum in Ondo and Ekiti states?

Hypothesis

The following hypothesis was formulated and tested at 0.05 level of significance:

1. Teachers' teaching experience does not significantly influence their implementation roles in business Education curriculum in Ondo and Ekiti states.

Methods

The study adopted a survey research design. It sought information from business educators from the six tertiary institutions offering business education and office technology and management in Ondo and Ekiti states. The institutions are Adeyemi Federal University of Education, Ondo; Adekunle Ajasin University, Akungba-Akoko in Ondo state and Ekiti State University, Ado- Ekiti; Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti and the Federal University, Oye-Ekiti, all in Ekiti state. The population of the study comprised of all the thirty six (36) business education Lecturers each, totaling 72, from Ondo and Ekiti states public Universities. There was no sampling since the populat ion was manageable.

The instrument for data collection was a structured questionnaire tagged "Promoting Business Education Curriculum Implementation in Nigeria Universities'. The questionnaire was organised into two sections - A and B. Section A contains four items on lecturers" personal data. Section B contains nine items on modified evaluation techniques The instrument was five-point Likert rating scale designed to attract the following points, Very High Extent (VHE) = 5, High Extent (HE) = 4, Moderate Extent (ME) =3, Low Extent (LE) = 2; and Very Low Extent (VLE) = 1. The face and content validity of the instrument was validated by two experts, from Adekunle Ajasin University, Akungba –Akoko and Ekiti State University, Ado- Ekiti, who made useful inputs and this was eventually incorporated into the final questionnaire.

The Instrument was administered by the researcher with the help of two research assistants. The internal reliability of the instrument was measured using Crombach Alpha which yielded a correlation coefficient of 0.78 showing a high reliability index meaning that the instrument was reliable. Mean and standard deviation were used to

answer the research questions and determine the homogeneity of the respondents' opinions. t-test was used to test the null hypothesis at 0.05 level of significance. A hypothesis was rejected where the P- value is less than the alpha value but accepted where the P- value is greater than or equal to the alpha value. Each item was interpreted based on the real limit of the mean corresponding to each item.

Results

Hypothesis One: Teachers' teaching experience does not significantly influence their roles in business Education curriculum implementation in Ondo and Ekiti states.

Table 1: The t-test Analysis of influence of Teachers' Teaching Experience in Promoting the Implementation of Business Education Curriculum in Ondo and Ekiti states.

Variables	N	X	Std Dev	Df	t-cal	P-value
Experienced	51	18.13	1.74	70	0.633	0.252
Inexperienced	21	18.54	1.51			

Table 1 revealed that the mean values of inexperienced and experienced teachers on their implementation of business education are 18.13 and 18.54 respectively. The t-cal of 0.633 at df= 70 is not significant at p-value of 0.252. Since the p-value is greater than alpha level of 0.05, the null hypothesis is accepted. This means that teachers' teaching experience did not significantly influence their implementation roles of business education curriculum.

Discussion of Findings

The findings of the hypothesis on teaching experience revealed that there is no significant influence of teaching experience on teachers' implementation roles of business education curriculum. This means that experienced and inexperienced business education teachers do not differ in their implementation of business education curriculum. Contrary to the findings of this study, the findings of Imeokparia (2015) found that teachers with lesser teaching experience perceived their curriculum implementation differently from teachers with higher teaching

experience. In other words, teaching experience has significant influence on their curriculum implementation. Her findings showed that teachers with different teaching experience perceived their curriculum implementation according to their teaching experience ability.

Conclusion

Based on the findings of this study, it was concluded that experience of teachers did not influence their business education implementation roles. This is of a great concern and poses a major challenge to all stakeholders in teacher education in Nigeria.

Recommendations

The following recommendations are made based on the findings of this study:

1. There is need for the professional teachers with experience to always distinguish themselves.
2. Perceived teachers with less experience should be encouraged and motivated in order for them to be able to discharge their duties very well.
3. Stakeholders should de-emphasize the idea of experience and consider other variables.
4. The government should put mechanisms in place to really ascertain the outputs of both experienced and inexperienced teachers.
5. Both experienced and inexperienced teachers should be encouraged to continuously develop themselves by attending workshops, in-service trainings, seminars and conferences.

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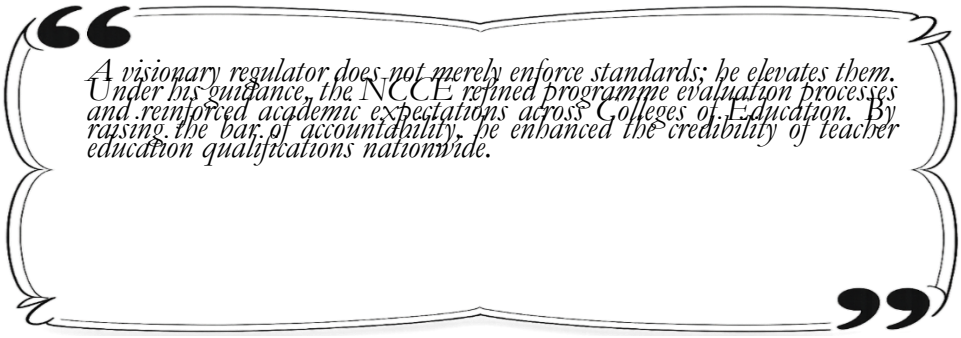
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Chapter 12

An Assessment of the Influence of Effective Communication on Learners' Performance at the National Open University of Nigeria: *A case study of Abuja Model Study Centre, Dutse*

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Abstract

This study examined the role of effective communication in enhancing learners' performance at the Abuja Model Study Centre, Dutse, of the National Open University of Nigeria (NOUN). A descriptive survey research design was employed. The population comprised over 4,000 registered students at the study centre, from which a sample of 120 respondents was selected using a stratified random sampling technique to ensure adequate representation. Data were collected through a structured questionnaire and analysed using descriptive statistics, including frequency counts and percentages. The findings revealed that the study centre employs multiple communication channels, including WhatsApp, email, Learning Management System (LMS) announcements, SMS, and physical notice boards. Among these, WhatsApp and LMS platforms were identified as the most effective for timely and clear dissemination of information. The study further established that effective communication significantly enhances learners' engagement, academic performance, and operational efficiency. However, several challenges were identified, including inadequate ICT infrastructure, limited technical competence, network failures, unclear messaging, and delays in information flow from the headquarters. In response to these findings, the study recommends the standardization of communication protocols and improvements in ICT support systems. The study concludes that effective communication is a critical determinant of learners' performance and that addressing existing communication challenges will enhance academic efficiency, learner satisfaction, and overall operational effectiveness at NOUN study centres.

Keywords: *Effective Communication, Learners' Performance, Communication barriers, communication channels/media. Open and distance learning.*

Introduction

Communication is widely recognized as a critical factor influencing learners' performance within educational institutions, as it serves as the primary channel through which academic information, learning expectations, feedback, and institutional directives are conveyed. Recent studies emphasize that effective communication enhances learners' understanding of academic requirements, improves engagement, and supports timely completion of learning activities, particularly in educational environments where coordination and clarity are essential (Adegboye & Salisu, 2023). When communication is clear, consistent, and responsive, learners are better positioned to meet academic expectations and achieve improved learning outcomes.

In educational institutions, effective communication plays a vital role in supporting learners' performance by facilitating access to academic information, guidance, and feedback. Clear communication between administrators, facilitators, and learners helps reduce confusion regarding course materials, assessments, schedules, and institutional policies. This is especially important in technology-driven and distance-learning systems, where learners rely heavily on timely and accurate information to manage their studies independently. Studies indicate that effective communication in such settings enhances learner satisfaction, motivation, and academic achievement (UNESCO, 2023).

The National Open University of Nigeria (NOUN), as Nigeria's leading Open and Distance Learning (ODL) institution, operates through a decentralized system of study centres that provide academic and administrative support to learners. These study centres are responsible for coordinating tutorials, facilitating learner counseling, managing assignments and examinations, and providing ICT support. Given NOUN's flexible and technology-based delivery model, the effectiveness of communication between headquarters, study centre personnel, facilitators, and learners has a direct impact on learners' academic performance. Consistent and well-structured communication ensures that learners receive accurate information, timely feedback, and adequate academic support, all of which contribute to improved learning outcomes (NOUN Directorate of Learning Content, 2024).

Furthermore, institutional reports indicate that effective communication within NOUN enhances learners' performance by reducing administrative bottlenecks, improving access to learning resources, strengthening academic support systems, and promoting active learner participation. In an ODL environment where face-to-face interaction is limited, the quality of communication through digital platforms, virtual facilitation tools, and study centre channels becomes a determining factor in learners' academic success (NOUN DLSS Report, 2025).

Statement of the Problem

Effective communication is fundamental to the success of learners in any educational institution, particularly within a decentralized Open and Distance Learning (ODL) system such as the National Open University of Nigeria (NOUN). In ODL contexts, communication serves as the primary link through which learners receive academic information, guidance, feedback, and institutional support. At the Abuja Model Study Centre, however, persistent communication challenges continue to hinder learners' academic performance and overall learning experience.

One major challenge is the delayed and inconsistent flow of communication between NOUN headquarters and the study centres. Essential learner-related information such as course registration timelines, examination schedules, assignment submission deadlines, tutorial arrangements, and policy updates is often communicated late or irregularly. This delay creates confusion among learners, increases anxiety, and sometimes results in missed deadlines, incomplete registrations, or poor examination preparedness, all of which negatively affect learners' academic performance (Itasanmi & Mampane, 2025).

Another critical issue affecting learners' performance is the absence of a standardized communication framework at the Abuja Model Study Centre. The centre relies on multiple communication channels, including WhatsApp, SMS, email, LMS announcements, and physical notice boards. While these platforms are intended to enhance information dissemination, the lack of coordination and uniformity often leads to message duplication, conflicting information, and information overload. Consequently, learners struggle to identify official and accurate messages, which undermines effective academic planning and participation (Oyewole, Dauda & Fasipe, 2024).

Furthermore, communication barriers such as inadequate ICT infrastructure, limited technical competence among some staff, unclear or ambiguous circulars, and weak feedback mechanisms further impede effective communication with learners. These challenges reduce timely access to learning materials, limit meaningful interaction between facilitators and learners, and weaken academic support services. Studies indicate that despite the adoption of e-learning platforms, many Nigerian tertiary institutions face infrastructural and capacity- related constraints that adversely affect communication efficiency and learners' academic outcomes (Mada, 2025; Daramola & Aladesusi, 2023).

As a result of these communication gaps, learners at the Abuja Model Study Centre which is a local facility of the National Open University of Nigeria (NOUN) that provides administrative support, tutorial facilitation, and student services within a specific geographic location within Abuja, may experience poor academic coordination, reduced engagement, low satisfaction, and diminished academic

performance. Missed deadlines, delayed feedback, unclear academic expectations, and limited access to support services all contribute to suboptimal learning outcomes in the ODL environment.

Despite the significance of communication to learners' performance, there is a noticeable lack of empirical studies examining how communication practices specifically affect learners' academic performance within the Abuja Model Study Centre and ODL study centres in the Abuja metropolis. This gap highlights the need for a focused assessment of communication effectiveness and its influence on learners' performance, with the aim of informing evidence-based strategies for improving learning outcomes in NOUN.

Objectives of the Study

i. Examine the communication channels used in the Abuja Model Study Centre.
ii. Assess the influence of effective communication on learners' performance at the Abuja Model Study Centre.
iii. Identify the challenges affecting communication flow in the Abuja Model Study Centre.
iv. Determine strategies for improving communication effectiveness and enhancing learners' performance at the Abuja Model Study Centre, Abuja

Research Questions

i. What communication channels are used in the Abuja Model Study Centre?
ii. How does effective communication influence learners' performance at the Abuja Model Study Centre?
iii. What challenges affect communication flow in the Abuja Model Study Centre?
iv. What strategies can enhance communication effectiveness and improve learners' performance at the Abuja Model Study Centre, Abuja?

Scope of the Study

This study focuses on the role of effective communication in influencing learners' performance within the National Open University of Nigeria (NOUN), with particular emphasis on the Abuja Model Study Centre in the Abuja metropolis. The study examines the communication channels, communication practices, and a barrier encountered by NOUN learners domiciled in the Abuja Model study center and evaluates how these communication- related factors affect learners' performance outcomes.

Specifically, the study assesses learners' performance indicators such as timely access to academic information, clarity of instructional guidelines, learner engagement, academic coordination, service delivery efficiency, and learners'

satisfaction within the Open and Distance Learning (ODL) environment. The study is restricted to communication processes, academic activities, and learner-related interactions observed during the 2024–2025 academic session.

Concept of Effective Communication

Effective Communication is the process of transmitting information clearly, accurately, and timely between individuals or groups in an organisation, ensuring mutual understanding and minimal misinterpretation. Effective communication is a multidimensional process that goes beyond merely sending and receiving messages; it ensures that the intended meaning is clearly understood and can be acted upon appropriately. It involves several key components, including message clarity, appropriate selection of communication channels, timeliness, feedback mechanisms, and the interpersonal competence of both sender and receiver (Robbins & Judge, 2024).

At the Abuja Model Study Centre, effective communication is critical for ensuring smooth information flow between NOUN management and the learners. It facilitates the coordination of academic schedules, administrative directives, examination processes, tutorial facilitation, and student support services. Various forms of communication are employed within the centre:

1. **Verbal Communication:** Face-to-face discussions, staff meetings, and tutorial instructions that allow immediate clarification and feedback.
2. **Non-Verbal Communication:** Body language, facial expressions, gestures, and posture that complement verbal messages and convey emotions or attitudes.
3. **Written Communication:** Emails, circulars, notices, reports, and memos that provide a permanent record of information.
4. **Digital Communication:** Technology platforms such as WhatsApp groups, Learning Management Systems (LMS), SMS, and institutional websites, which allow rapid and wide dissemination of information (Oyewole, Dauda & Fasipe, 2024).

Effective communication in NOUN study centres is not merely about transmitting information but ensuring that messages are relevant, clear, timely, and actionable. It fosters trust, transparency, and collaboration among staff and learners, reduces misunderstandings and errors, enhances decision-making, and strengthens organisational culture. In a decentralized system like NOUN, where study centres operate across diverse locations under central management, robust communication practices are essential for synchronizing operations, maintaining service quality, and achieving institutional objectives.

Furthermore, effective communication directly supports learners' performance by improving clarity of instructions, timely access to learning materials, responsiveness to queries, and overall engagement in academic activities. It also enhances organisational performance by boosting staff morale, increasing operational efficiency, ensuring timely service delivery, and raising student satisfaction (Itasanmi & Mampane, 2025). In essence, the quality and effectiveness of an organisation's communication system are closely linked to both staff productivity and learners' academic success.

Concept of Learners Performance

Learners Performance the measurable academic outcomes and achievements of students within an educational setting, reflecting their understanding, engagement, and application of knowledge. In the context of Abuja Model Study Centre, learners' performance includes timely completion of assignments, participation in tutorials, performance in examinations, comprehension of course materials, responsiveness to feedback, and overall satisfaction with the learning process in an Open and Distance Learning (ODL) environment.

Learners' performance in educational institutions refers to the extent to which students achieve desired academic outcomes, engage effectively in learning activities, and meet the expectations of their academic programmes. Learners' performance focuses specifically on the outcomes of the educational process as influenced by institutional practices, including communication.

At NOUN study centres, learners' performance can be accessed through several key indicators:

1. **Timely Completion of Academic Tasks:** The ability of learners to submit assignments, participate in tutorials, and meet examination deadlines.
2. **Engagement in Learning Activities:** The extent to which learners actively participate in tutorials, discussions, and other academic interactions.
3. **Comprehension and Application of Knowledge:** How well learners understand course content and apply acquired knowledge in assessments.
4. **Learner Satisfaction:** The degree to which students feel adequately supported, informed, and guided throughout their learning process (John & Eze, 2025).

Learners' performance is closely linked to organisational and communication practices. Effective communication ensures that learners receive clear instructions, timely feedback, and necessary academic support, enabling them to plan, manage, and complete their studies efficiently (Robbins & Judge, 2024). When communication flows seamlessly between NOUN headquarters, study centre staff,

tutors to students, learners can access relevant information, seek clarifications, and participate actively in learning activities, resulting in higher engagement and academic achievement (Mada, 2025).

Furthermore, learners' performance is influenced by factors such as leadership effectiveness, staff motivation, organisational culture, and the use of technology to support communication. In decentralized institutions like NOUN, where study centres operate across multiple locations, robust communication frameworks are essential for aligning learning support with institutional goals and ensuring consistent performance standards among learners (Oyewole, Dauda & Fasipe, 2024).

In summary, learners' performance in NOUN study centres is a multidimensional concept reflecting academic achievement, engagement, and satisfaction, all of which are heavily dependent on the effectiveness of communication practices and the efficiency of administrative and instructional processes within the centres.

Communication Channels

Communication Channels are the mediums through which information is transmitted within Abuja Model study centre, including face-to-face meetings, emails, WhatsApp groups, notice boards, and Learning Management System (LMS) announcements. They are the routes through which information flows from the sender to the receiver, while communication media are the tools or platforms used to deliver these messages. The effectiveness of communication largely depends on selecting the appropriate channel and medium, taking into account the purpose of the message, the characteristics of the audience, and the urgency of the information (Clampitt, 2024).

At the Abuja Model Study Centre, a variety of communication channels and media are employed to support academic, administrative, and operational activities, including:

1. **Face-to-Face Communication:** In-person meetings, staff briefings, and tutorial sessions that allow immediate clarification, feedback, and engagement. This channel is particularly effective for resolving complex issues, conveying sensitive information, and fostering strong interpersonal relationships (John & Musa, 2023).

2. **Written Communication:** Emails, circulars, memos, reports, and notices provide a permanent record of information. Written communication is essential for formal documentation, policy dissemination, and ensuring that instructions can be referenced when needed.

3. **Digital Communication:** Platforms such as WhatsApp groups, Learning Management System (LMS) notifications, SMS, and institutional websites

enable rapid dissemination of information to large audiences. Digital media are especially valuable in NOUN's decentralized system, bridging geographical distances and facilitating timely learner support (Oyewole, Dauda & Fasipe, 2024).

4. **Telecommunication:** Telephone calls, virtual meetings, and teleconferences provide direct verbal communication over distances. These channels support immediate clarification, coordination, and response between staff and managers, enhancing operational efficiency (Eze & Adeyemi, 2025).

5. **Notice Boards and Bulletin Boards:** Traditional media used to display announcements, timetables, and circulars. These serve as accessible information points for both staff and learners within the study centre environment.

The choice of communication channel and medium significantly affects message clarity, speed, and reach. For example, urgent updates such as changes in examination schedules are most effectively communicated digitally, whereas detailed or sensitive instructions may require face-to-face meetings or formal written documentation. Misalignment between message type and channel can result in misunderstandings, delays, and reduced learners' engagement or academic performance.

In summary, the effective use of communication channels and media at NOUN study centres ensures that information is timely, accessible, and clearly understood. This, in turn, enhances academic coordination, administrative decision-making, and overall learners' performance and organisational effectiveness (Itasanmi & Mampane, 2025).

Barriers to Effective Communication

Communication Barriers are obstacles that hinder the smooth flow of information within the organization, such as delayed messages, poor ICT infrastructure, unclear instructions, information overload, or lack of feedback mechanisms. According to IJMR (2025), Barriers to effective communication are factors that obstruct the smooth, accurate, and timely flow of information within an organization. These barriers often result in misunderstandings, operational delays, reduced staff productivity, and lower levels of learners' satisfaction and academic performance. At the Abuja Model Study Centre, such barriers significantly affect both administrative and academic activities, limiting the centre's ability to operate efficiently (Tourish & Robson, 2024).

Common barriers include:

1. **Delayed or Inconsistent Communication:** Messages from headquarters or centre management that arrive late, are incomplete, or conflict with previous directives create confusion among staff and learners, resulting in errors, repeated clarifications, and missed deadlines (John & Eze, 2025).
2. Inadequate ICT Infrastructure: Challenges such as unstable internet connectivity, limited access to the Learning Management System (LMS), and insufficient digital devices hinder timely communication and disrupt academic delivery (Mada, 2025).
3. Low Technical Skills: Staff and learners who lack competence in using digital platforms may misinterpret, ignore, or fail to access critical information, slowing both administrative and academic processes (Oyewole, Dauda & Fasipe, 2024).
4. Ambiguity and Poor Message Clarity: Circulars, emails, or verbal directives that are unclear, ambiguous, or poorly structured can cause mistakes, task duplication, and misinterpretation of responsibilities (Adebayo & Nwosu, 2023).
5. Information Overload: The simultaneous use of multiple communication channels such as WhatsApp, email, SMS, and notice boards without coordination can overwhelm recipients, causing important messages to be overlooked.
6. Lack of Feedback Mechanisms: Limited avenues for staff and learners to ask questions, seek clarification, or respond to messages reduce the effectiveness of communication and allow misunderstandings to persist.
7. Cultural and Language Differences: Variations in terminology, language proficiency, or organisational norms can affect how messages are interpreted, particularly within a diverse student population.
8. Resistance to Change: Some staff or learners may be reluctant to adopt new communication systems or digital tools, slowing technological integration and limiting message reach (Eze & Adeyemi, 2025).

Addressing these barriers requires strategic interventions, including improved planning, staff training, standardized communication procedures, and investment in modern ICT tools. Reducing communication barriers enhances message clarity, promotes staff collaboration, strengthens operational efficiency, and improves learners' engagement, satisfaction, and overall academic performance at the Abuja Model Study Centre.

Relationship Between Communication and Learners Performance

Effective communication is a critical determinant of learners' performance. Organisations that foster clear, consistent, and timely communication experience higher levels of coordination, operational efficiency, and stakeholder satisfaction (Robbins & Judge, 2019; Hargie, 2016; John, 2023). At the Abuja Model Study Centre, the relationship between communication and learners' performance is particularly significant due to the decentralized nature of operations and the reliance on multiple channels to coordinate academic, administrative, and student support activities (Ahmed & Bello, 2024).

Effective communication positively influences learners' performance in several ways:

1. **Improved Decision-Making:** Timely and accurate information allows staff to make informed academic and administrative decisions, which ensures that learners receive the necessary guidance, support, and resources for optimal performance (Olatunji, 2023).

2. **Enhanced Coordination and Collaboration:** Clear communication ensures that administrative staff, tutors, and learners understand their roles and responsibilities, reducing task duplication, promoting teamwork, and creating a supportive learning environment (Okafor & James, 2025).

3. **Increased Staff Motivation and Morale:** Transparent communication fosters trust and reduces uncertainty among staff, motivating them to provide better instructional support and timely feedback, which directly benefits learners' engagement and academic outcomes (John, 2023; Musa, 2024).

4. **Learner Satisfaction:** Effective communication ensures that learners receive accurate information about tutorials, assignments, examinations, and administrative procedures. This enhances learners' understanding, engagement, and overall learning experience (Eze & Haruna, 2024).

5. **Operational Efficiency:** Smooth information flow reduces errors, prevents delays, and ensures that academic and administrative processes are executed efficiently, enabling learners to meet deadlines, access resources on time, and achieve better academic results (Dauda, 2025). Conversely, ineffective communication can lead to misunderstandings, poor coordination, delayed feedback, reduced learner engagement, and lower academic achievement. Studies show that institutions with strong communication systems consistently outperform those with weak or inconsistent communication frameworks (Daft, 2018; Clampitt, 2016; John, 2023). In decentralized

educational settings like NOUN, maintaining robust communication practices is crucial for synchronizing operations across multiple study centres and ensuring consistent learners' performance. Hence, there is a direct and positive relationship between effective communication and learners' performance. Strengthening communication channels, addressing communication barriers, and promoting regular feedback mechanisms are essential strategies for enhancing learners' engagement, satisfaction, and academic success at NOUN study centres (Ahmed & Bello, 2024; Okafor & James, 2025).

Methodology

Research Design

The study adopted a descriptive survey research design to examine effective communication and its impact on learners' performance at the Abuja Model Study Centre of the National Open University of Nigeria (NOUN). This design was considered appropriate as it enabled the collection of firsthand data on communication practices, communication barriers, and their perceived influence on learners' academic outcomes without manipulation of variables.

Population and Sample

The population of the study comprised all registered students of the Abuja Model Study Centre, estimated at over 4,000 learners. A sample size of 120 students was selected using a stratified random sampling technique. The student population was divided into relevant strata to ensure adequate representation, after which respondents were randomly selected from each stratum.

Instrument for Data Collection

Data were collected using a structured questionnaire titled *Communication Effectiveness and Learners' Performance Questionnaire (CELPQ)*. The instrument consisted of sections covering respondents' demographic characteristics, communication channels and practices, message clarity and timeliness, feedback mechanisms, communication barriers, and indicators of learners' performance such as assignment completion, tutorial participation, and overall engagement. Responses were measured using a five-point Likert scale ranging from *Strongly Agree* to *Strongly Disagree*.

Validity and Reliability of the Instrument

Content validity of the instrument was established through expert review. A pilot study involving 15 respondents was conducted to assess clarity and suitability of the

items. Reliability was determined using Cronbach's alpha, with coefficients exceeding 0.70, indicating acceptable internal consistency.

Data Collection Procedure

Approval was obtained from the study centre authorities prior to data collection. Questionnaires were administered both physically and electronically. Respondents were briefed on the purpose of the study, assured of confidentiality, and encouraged to provide honest responses. Completed questionnaires were screened for completeness and accuracy before analysis.

Method of Data Analysis

Data collected were analysed using descriptive statistics, including frequency counts and percentages, to address the research questions. Cross-tabulations were applied where necessary to examine relationships between communication practices and learners' performance.

Limitation of the Study

The study was limited to a single NOUN study centre and employed a descriptive research design, which restricts the generalization of findings. Nonetheless, the study provides valuable insights into the influence of communication practices on learners' performance within the NOUN Open and Distance Learning (ODL) context

Data Analysis

The data were collected from respondents and analyzed in relation to the research objectives and questions. A total of 120 questionnaires were distributed selected learners of Abuja Model study center Dutse Abuja Nigeria. All 120 were properly completed and returned, representing a 100% response rate. The data are presented in tables, supported with brief interpretations and discussions.

Table 1: Demographic Characteristics of Respondents

Gender		
RESPONDENTS	FREQUENCY	PERCENTAGE (%)
Male	45	37.5
Female	75	62.5
Total	120	100
26–35 years	45	37.5
36–45 years	35	29.2
46 years and above	15	12.5
Total	120	100
Age		
18–25 years	25	20.8

In the table 1 above, the demographic results show that out of the 120 respondents, 37.5% were male and 62.5% were female, indicating a higher female participation in the study. Most respondents were within the active age brackets of 26–35 years (37.5%) and 36–45 years (29.2%), suggesting a mature and educationally active population. Overall, the demographic distribution shows a diverse mix of participants capable of providing reliable views on communication and organisational performance in Abuja Model study centre in Abuja.

Table 2: What communication channels are used in Abuja Model study center?

Communication Channels	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Total**
WhatsApp is the most frequently used medium for passing information.	60 (50%)	50 (41.6)	8 (6.7)	2 (1.7)	120 (100%)

Email communication is used regularly for official correspondence.	40 (33.3)	55 (45.8)	20 (16.7)	5 (4.2)	120 (100%)
Physical notice boards at the centre provide important information to users.	35 (29.2)	50 (41.6)	25 (20.8)	10 (8.3)	120 (100%)

Table 2 above shows that most respondents recognize whatsApp is the most frequently used medium, followed by LMS announcements and email, indicating a reliance on both digital and formal platforms. While a majority agreed that these channels are effective, a smaller proportion expressed disagreement, especially regarding email usage, physical notice boards, and the standardization of communication. This suggests that although communication channels are generally in place, there are some gaps in clarity, consistency, and formal structure that could affect overall organisational performance.

Table 3: How does effective communication influence learners performance in Abuja Model study center?

Communication Effectiveness	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Total**
Information from the headquarters is communicated promptly.	50 (41.6)	55 (45.8)	10 (8.3)	5 (4.2)	120 (100%)
Instructions and circulars are clear and easy to understand.	45 (37.5)	50 (41.6)	15 (12.5)	10 (8.3)	120 (100%)
Communication between staff and students is smooth and responsive.	40 (33.3)	50 (41.6)	20 (16.7)	10 (8.3)	120 (100%)
The study centre provides timely updates on academic activities.	55 (45.8)	50 (41.6)	10 (8.3)	5 (4.2)	120 (100%)
Feedback from staff or students is acknowledged promptly.	35 (29.2)	50 (41.6)	20 (16.7)	15 (12.5)	120 (100%)
Conflicts arising from communication gaps are minimal.	30 (25)	50 (41.6)	25 (20.8)	15 (12.5)	120 (100%)

Table 3 above shows that most respondents perceive communication within NOUN study centres as effective. A majority agreed or strongly agreed that information from headquarters is communicated promptly and that circulars and instructions are generally clear. Updates on academic activities are largely timely, and communication between staff and students is mostly smooth. However, some respondents disagreed or strongly disagreed, particularly regarding feedback acknowledgment and the minimization of conflicts, indicating occasional lapses in responsiveness and communication clarity. Overall, while communication effectiveness is good, there is room for improvement in feedback mechanisms and reducing misunderstandings.

Table 4: What challenges affect communication flow within Abuja Model study center in Abuja?

Challenges that Affects Communication	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Total**
Poor ICT facilities affect effective communication.	50 (41.6)	55 (45.8)	10 (8.3)	5 (4.2)	120 (100%)
Some circulars/messages are ambiguous or unclear.	45 (37.5)	55 (45.8)	15 (12.5)	10 (8.3)	120 (100%)
Technical skills of some staff limit proper use of digital channels.	40 (33.3)	50 (41.6)	20 (16.7)	10 (8.3)	120 (100%)
Network failure/internet issues delay communication.	55 (45.8)	50 (41.6)	10 (8.3)	5 (4.2)	120 (100%)
Information overload makes it difficult to identify official messages.	35 (29.2)	50 (41.6)	25 (20.8)	10 (8.3)	120 (100%)

The above table 4 indicates that several challenges affect communication within NOUN study centres in Abuja. Most respondents agreed or strongly agreed that poor ICT facilities, network failures and technical limitation of staff hinder effective communication. Ambiguous circulars and information overload also contribute to difficulties in identifying official messages. These findings suggest that, although multiple communication channels exist, technical and operational barriers reduce the efficiency and clarity of communication, which can negatively impact overall organisational performance.

Table 5: What strategies can enhance communication effectiveness and improve learners' performance in Abuja Model study center, Abuja?

Strategies to enhance effective communication	Strongly Agree	Agree	Disagree	Strongly Disagree	Total
The use of WhatsApp groups should be encouraged in the study center.	50 (41.6)	55 (45.8)	10 (8.3)	5 (4.2)	120 (100%)
The use of SMS alerts in delivering messages to learners should be encouraged	55 (45.8)	50 (41.6)	10 (8.3)	5 (4.2)	120 (100%)
The use of email communications should be encouraged within the study center	45 (37.5)	55 (45.8)	15 (12.5)	5 (4.2)	120 (100%)
There should be an active use of notice boards in the study center.	50 (41.6)	50 (41.6)	15 (12.5)	5 (4.2)	120 (100%)

The table 5 above show strong support for all four communication strategies. Most respondents agreed that WhatsApp**,** SMS alerts**,** email, and notice boards should be actively used, with each strategy receiving over 80% positive responses. This indicates that learners and staff prefer a multi-channel communication system, as it improves timely access to academic information and enhances overall learners performance at the Abuja Model Study Centre.

Discussions & Findings

The study examined the role of effective communication on learners' performance at Abuja Model Study Centre, Dutse. Analysis of survey responses revealed several key insights.

Firstly, regarding communication channels, the study centre employs multiple platforms, including WhatsApp, email, LMS announcements, SMS, and physical notice boards. Respondents strongly agreed that WhatsApp and LMS announcements are the most frequently used and effective channels, reflecting NOUN's open and distance learning (ODL) model. However, some respondents noted inconsistencies in the use of email and notice boards, indicating areas where communication could be better standardized. These findings support prior research suggesting that combining digital and traditional channels improves message reach but requires coordination to avoid confusion (Clampitt, 2016; Seiler & Beall, 2018; John, 2023; Adeyemi & Musa, 2024).

Secondly, on communication effectiveness, most respondents perceived communication from headquarters and between staff and learners as generally timely, clear, and responsive. Academic updates, circulars, and instructions were mostly understood, and miscommunication-related conflicts were minimal. Nonetheless, a small proportion of respondents reported delays in feedback acknowledgment and occasional lapses in clarity, indicating room for improvement. These results align with Hargie (2016) and Tourish & Robson (2019), who note that effective communication strengthens workflow and decision- making, and are corroborated by more recent studies (Ojo & Ibrahim, 2023; Okeke, 2025).

Thirdly, respondents identified several barriers that impede smooth communication. Poor ICT infrastructure, limited technical skills among some staff, network issues, ambiguous messages, and delays in dissemination from headquarters were noted as significant challenges. Information overload also made it difficult to distinguish official communications. These barriers confirm earlier findings that technological limitations and unclear communication channels negatively affect performance in educational institutions (Robbins & Judge, 2019; Clampitt, 2016), and recent Nigerian ODL studies also highlight persistent infrastructural gaps and digital incompetence (Aminu & Bello, 2024; John, 2023).

Finally, regarding learners' performance, effective communication was found to have a positive impact. The majority of respondents agreed that platforms such as WhatsApp, email, SMS, and notice boards facilitate smooth interactions between the study centre and learners, enabling timely access to academic information and instructional support. This confirms that communication is not only a medium for information exchange but also a strategic enabler of learners' performance, consistent with the work of Seiler & Beall (2018) and supported by recent studies (Olatunji, 2023; Okafor & James, 2025).

In summary, the findings indicate that Abuja Model Study Centre, Dutse, generally maintains effective communication, which positively affects learners' performance. However, gaps in standardization, clarity, ICT infrastructure, and feedback mechanisms remain. Addressing these challenges would further enhance operational efficiency, reduce errors, and improve overall satisfaction among both learners and staff (Adeyemi & Musa, 2024; Okeke, 2025).

CONCLUSION

The study examined the role of effective communication in enhancing learners' performance at Abuja Model Study Centre, Dutse. Findings revealed that the centre employs multiple communication channels, including WhatsApp, email, LMS announcements, and physical notice boards, to disseminate information. Communication was generally perceived as timely, clear, and responsive, positively influencing learners' engagement, academic outcomes, and overall operational

smoothness. However, barriers such as poor ICT infrastructure, limited technical skills, network disruptions, ambiguous messages, and delays from headquarters occasionally hindered communication effectiveness. Overall, the study concludes that effective communication is a key driver of learners' performance, and further improvements in communication systems can enhance academic efficiency, learner satisfaction, and the overall effectiveness of the study centre.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed to enhance learners' performance through effective communication at Abuja Model Study Centre, Dutse:

1. **Standardize Communication Protocols:** The university should establish clear and uniform communication guidelines to ensure that all staff and learners receive accurate, consistent, and timely information.
2. **Invest in ICT Infrastructure:** Upgrading computers, internet connectivity, and Learning Management System (LMS) platforms at study centres will reduce technical barriers and improve the efficiency of digital communication.
3. **Staff Training and Capacity Building:** Regular training programs should be organized to enhance the technical and communication skills of staff, particularly in the use of digital tools and platforms in order to ensure accurate, unambiguous and fast communication from staff to students.
4. **Implement Feedback Mechanisms:** Structured feedback channels should be introduced to allow learners and staff to seek clarifications, report challenges, and facilitate responsive communication.
5. **Monitor and Evaluate Communication Practices:** Periodic assessment of communication channels and methods should be conducted to identify gaps and improve the overall effectiveness of communication in supporting learners' performance.

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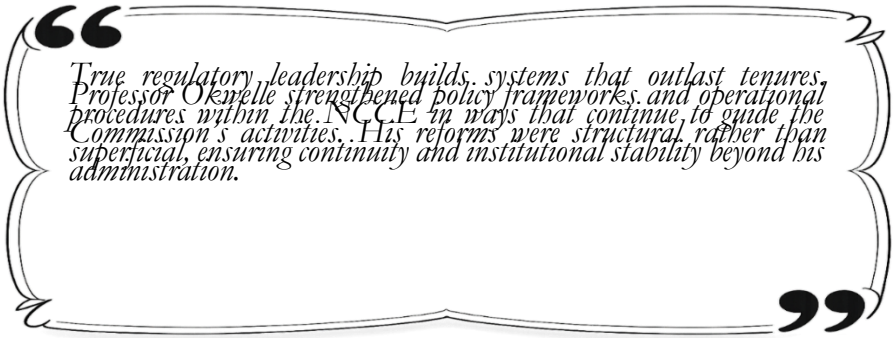
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Chapter 13

Lecturers' Perception of Competencies In E-Business Platforms as Requisite for Successful Entrepreneurship Among Marketing Education Graduates in Delta State

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Abstract

The study determined Lecturers' Perception of Competencies in E-business Platforms as Requisite for Successful Entrepreneurship Among Marketing Education graduates in Delta State. Two research questions guided the study. Two null hypotheses were tested. Descriptive survey research design was adopted for the study. The population comprised 97 business education lecturers in the three Colleges of Education in Delta State. The entire population was studied without sampling due to its manageable size. A questionnaire titled: "Competencies in E-Business Platforms as Requisite for Successful Entrepreneurship Among Business Education Graduates Questionnaire (CEBPRSEABEGQ), structured on a 4-point rating scale and contained 42-item question statements was used to generate data. The instrument was validated by two experts in Business Education and Measurement and Evaluation. The reliability test was determined using Cronbach Alpha which yielded overall coefficient value of 0.78. The 97 copies of the instruments were administered to the respondents and 89 were successfully retrieved and used for analysis. Mean and standard deviation were used to answer research questions while t-test was used to test the null hypotheses at 0.05 level of significance. Findings revealed that Shopify, Squarespace, Facebook, Instagram, TikTok, Google Ads. WooCommerce, Big Commerce, Wix, Ecwid, Square Online amongst others are essential for successful entrepreneurship among marketing education graduates and that business education lecturers are fairly competent in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State. It was recommended among others that essential e-business tools and platforms should be incorporated into the curriculum of Nigeria Certificate in Education (NCE) during

curriculum review and that business education lecturers should embark on self-sponsored training to acquire needed e-business competencies that would enable them utilize e-business platforms in preparing prospective enterprising self-reliant graduates.

Keywords: *Competencies, E-Business Platforms, Entrepreneurship, Marketing Education Graduates.*

Introduction

In a digital economy where automation and Artificial Intelligence (AI) are dominating and shaping virtually every aspect of activities previous coordinated manually, competencies in leveraging these innovations are extremely important. The modern business engagements have digitally transformed the old system of conducting marketing/commercial activities. With Electronic Business (e-business) platforms such as e-commerce marketplaces namely: Amazon, Shopify; and social commerce channels to digital payment systems and analytics tools, marketing of goods and services experience unlimited global reach. With these undeniable technological advancements, marketing education graduate entrepreneurs are increasingly required to possess competencies in e-business platforms which include E-Commerce platforms which enable online buying and selling (examples are Shopify, WooCommerce, Magento, BigCommerce); customer relationship management systems, social media marketing tools, and cloud-based collaboration software among others. These tools not only facilitate operational efficiency but also enhance market reach, customer engagement, and overall competitiveness. In response to this paradigm shift, educational institutions particularly those offering marketing education programme and their lecturers who are the curriculum implementers have a major stake in inculcating the right knowledge, attitudes and skills adequate for the marketing education graduates to excel in e-business as entrepreneurs.

Business Education as a discipline is designed to equip students with the knowledge, skills and attitudes necessary for effective participation in the business world. Business education is seen as that aspect of vocational education that provides specialized instructions to recipients with knowledge, skills and attitudes for them to properly fit into employment opportunities in diverse settings. Okoli, Nwalado and Okolo (2023) asserted that business education programme provides entrepreneurial skills for its recipients that would enable them to start up small or medium scale enterprises (SMEs); production and manufacturing of goods and services in vocational trades. The authors further stated that mastering the skills in business education would position the students to be self-reliant, self-employed and job creators on graduation. Jim (2023) described business education as one of the

indispensable programme of studies and aptitudes for employment and self-actualization. Hence the objectives of Business Education in the National Policy on Education (FGN, 2013) include; to provide technical knowledge for business and economic development and to give training and impart the necessary business skills leading to the production of skilled personnel who shall be enterprising and self-reliant. Business Education as a discipline offered in College of Education, has options such as Accounting Education, Entrepreneurship Education, Marketing Education and Office Technology Management Education and the goal is not only to prepare students for teaching career but also to empower them to venture into diverse business opportunities for self-reliance. Among the curriculum contents offered by Marketing Education Students include Entrepreneurship in Business Education; Consumer Needs, behaviour and Protection; Marketing Environment and Control; Collaborations and Innovation of New Products; Distribution Channels and Promotion Management and Direct and Online Marketing. Skills embedded in these courses, if well acquired would no doubt help marketing education graduates to thrive in e-business as an entrepreneur. According to Jim (2023), College of Education is among the tertiary levels of education in Nigeria educational system, which is aimed at preparing teachers with necessary teaching skills, competencies and methods. It means that, this level of education produces qualified Nigeria Certificate in Education (NCE) graduates, who would teach in basic education system, work in other sectors of the economy and as well be self-reliant entrepreneurs based on diverse skills and competencies acquired during training. Hence, the perception of business education lecturers who are the implementers of business education curricula are vital in ascertaining e-business competencies for shaping the quality of entrepreneurial training received by marketing education graduates in this digital era.

E-business (Electronic Business) platforms refer to broad digital environments like Shopify, Amazon amongst others, that host the online business. E-business platforms are software solutions that let companies build, run, and manage online stores, handling everything from website design, and product listings to payments, inventory and customer management. Examples include Shopify, WooCommerce, BigCommerce, Wix, Adobe Commerce, Squarespace, Big Cartel, Square Online, Shift4Shop, Volusion and OpenCart, (Alexandra, 2025). According to Didzis (2024), best e-commerce platforms for business are Wix, Shopify, Magnento, Square Online, BigCommerce, Squarespace, Ecwid, WooCommerce and NetSuite. Others are large marketplaces like Amazon/eBay, empowering businesses to sell online efficiently. Categories of e-business platforms include E-Commerce platforms which enable online buying and selling (examples are Shopify, WooCommerce, Magento, BigCommerce); e-Mail marketing platforms like Mail Chimp which is a powerful tool for driving sales through email, ads and landing pages. social media management and Ads (Google Ads, Mailchimp, Hootsuite, SEMrush); Content Management

Systems (CMS) – manage and publish digital contents (WordPress, Drupal, Joomla). Freitas (2023) described e-business as any type of business that is conducted over the internet or other electronic networks; which includes online shopping, online banking, e-learning, e-health and other online services. According to Barney, Pratt and Cole (2025), E-business is the conduct of online business processes on the web, internet, extranet or a combination thereof. These customer, internet and management-focused business processes include buying and selling of goods and services, servicing customers, processing payments, managing production and supply chains, collaborating with business partners, sharing information, running automated employee services and recruiting employees.

The growth of e-business in recent decades has given rise to new business requirements. Customers expect organizations to provide self-service options to conduct transactions, personalized experiences and speedy secured transactions (Barney, Pratt & Cole (2025). However, possessing the needed competencies to effectively utilize these e-business platforms is vital in shaping the future of marketing education graduates in today's digital economy. The authors further submitted that the advantages of e-business stems from drastically changing from how enterprises, government agencies, non-profit organizations and other institutions operate, enabling them to increase productivity, lower costs, move more quickly towards digital business transformation and upgrade processes. Electronic invoicing, automated billing and digital payment systems, lower the amount of time workers devote to these tasks; electronic communication systems such as email, video conferencing and online collaboration platforms, increase productivity by timely feedback which aids faster decision making. Eliminates unnecessary business travels as transactions can be done from homes or other locations while offering 24/7 business transactions and small businesses can conduct business globally. For marketing education graduates to garner these benefits of engaging e-business platforms as practicing entrepreneurs, the lecturers must be adequately knowledgeable and skillful in e-business tools and platforms, else, it may hinder the effective transfer of these critical competencies to would-be graduates.

Competencies refer to combination of knowledge, skills, behaviours, and attitudes that enable an individual or organization to perform tasks effectively and achieve desired outcomes. They go beyond mere technical expertise, encompassing cognitive, interpersonal, and practical capabilities required for success in a specific role or context. Similarly, Onah (2018) viewed competencies as abilities or power and authority of skills, knowledge and facts necessary for accomplishing task on the job. In totality, competencies represent holistic capability frameworks that bridge the gap between theoretical knowledge and real-world application. Azih and Amah (2019) asserted that adequate possession of competencies by lecturers for utilizing basic computer-users' software will facilitate effective curriculum implementation in any field of learning. Consequently, possession of competencies on e-business

platforms is considered essential for marketing education graduates' entrepreneurship success. For instance, a marketing graduate entrepreneur who possesses competencies in e-business could utilize "Shopify", which is user-friendly e-commerce platform to create online store and start business from home and grow to international brand with physical front store, manage products, process payments and scale business. Wix is a versatile drag and drop website builder that offers customizable templates, web hosting and domain name registration. Wix integrates with sales channels like Facebook and Instagram through Ecwid serving as the third party app. Ecwid offers advanced features for online business with user-friendly interface, customizable templates and integrated payment gateways. WooCommerce uses WordPress that allows for easy creation of online stores. BigCommerce offers web hosting and customization options for e-commerce store, SEO and listing products on marketplaces. BigCommerce lower price points, integrate over 65 payment providers and supports more than 140 currencies, and provides phone and live chat supports on all plans. However, BigCommerce integrates with sales channels like Google Shopping, Facebook, Amazon and Etsy (Alexandra, 2025). Entrepreneurs could leverage Instagram interactive live features to showcase their products' visibility, tell brand stories capable of attracting potential customers for patronage. Also, use Facebook, a social media platform to sell products, engage customers and run targeted adverts and free store fronts to showcase products for the business. TikTok could be used to advertise and sell products and services to targeted audience which are already standby on live stream, Odetayo and Iroanya (2024) submitted that Instagram has become a critical sales and marketing channel for many informal and home-based businesses in urban centers like Lagos, Abuja and Port-Harcourt, especially among fashion retailers, makeup artists and food vendors. As well as the ability to use Meta Business suite for social commerce, ads, and customer engagement, especially when paired with Facebook shops or Instagram shopping and much more. Likewise, E-mail marketing platforms like Mail Chimp, MailerLite, Brevo, HubSpot and so on, are affordable and user-friendly easy to build automated email campaign for e-business. These e-mail marketing platforms help for driving sales through email, ads and landing pages.

Thus, acquiring competencies in those e-business platforms is considered necessary for marketing education graduates' entrepreneurial success and global competiveness. This way, the graduates are self-reliant, self-employed, job creators, provision of digital goods and services and global business practitioners. Especially, considering the high rate of graduates' unemployment in Nigeria. Ezoem, Okpuzor, Orhorhoro and Okolo (2024) rightly submitted that without appropriate training given to business education graduates, they cannot show good competencies in their various work or as an employer of labour. In this 21st century, graduates are expected to be equipped with several digital competencies in order to be productively employed or create their own jobs.

Therefore, understanding the perceptions of business education lecturers on their competencies in e-business platforms could provide insights into potential gaps in the curriculum and inform policy recommendations for enhancing digital business entrepreneurship education. This is because, Badawia, Reyada, Khamisa, Hamdana, and Alsartawia, (2019) had reported that the curriculum content of business education provides a theoretical framework beneficial for understanding business management and, at the same time, provide undergraduates with the knowledge, skills and techniques arguably indispensable to become successful entrepreneurs.

For this study, respondent variables are male and female business education lecturers with diverse teaching experiences. It is likely that male lecturers could rate their responses higher than the females as they tend to be more ICT compliant. Likewise, experienced business education lecturers could rate their responses higher than the less experienced based on their professionalism. Conversely, there is possibility that less experienced lecturers with high digital skills could rate higher then experienced lecturers who are not ICT digital-friendly. However, the study is embarked upon considering these varying factors.

Statement of the Problem

In this digitalized society and artificial intelligence in the forefront, the perception of what constitutes essential electronic business (e-business) competencies as requisite for successful entrepreneurship among marketing education graduates are key drivers to instructional design, content delivery and skills building of recipients. The increasing digitalization of the global economy has transformed the way businesses are initiated, conducted, and profitably sustained. In today's digital economy, entrepreneurs are expected to demonstrate competency in various e-business platforms to remain competitive, relevant and excel in the conduct of e-businesses. For marketing education graduates of colleges of education, who are trained to function either as employees or self-reliant entrepreneurs, competencies in e-business platforms and digital technologies have become indispensable. Though, modern courses are mounted in the marketing education curriculum such as Marketing Environment and Control; Collaborations and Innovation of New Products; Distribution Channels and Promotion Management and Direct and Online Marketing (NCCE Academic Standards, 2020), yet the implementation process and transferability of inherent skills and competencies to recipients remain utmost important for graduates' entrepreneurial success.

However, despite the growing relevance of digital skills in entrepreneurship there is a growing concern that marketing education curriculum and its implementation in tertiary institutions, particularly in colleges of education may not be adequately aligned with the demands of the modern business environment. This misalignment could stem from the limited awareness, or competence of lecturers in the use of e-business platforms. If lecturers perceive the e-business platforms competencies as

critical, they are more likely to innovate their teaching methods, upgrade their skills and advocate for curriculum modernization. On the other hand, it could result to curriculum misalignment with market realities and marketing education graduates ill-equipped with the digital demands of the 21st century. This is evident as competencies that were sought after few years ago have become obsolete. The traditional marketing has loosed its relevance in this modern economy as digital marketing makes life easier and comfortable.

Many graduates struggle to leverage e-business platforms such as e-commerce websites, digital marketing tools, payment gateways and customer relationship management system among others in enhancing the success rate of their entrepreneurship. This skills gap limits their ability to launch, manage and scale sustainable businesses in an increasingly competitive market. This situation raises critical questions about the extent to which business education lecturers perceive competencies in e-business platforms as essential for entrepreneurship, and how this perception influences the preparation of marketing education graduates in Delta State.

Research Questions

1. What are e-business platforms essential for successful entrepreneurship among marketing education graduates in Delta State?
2. To what extent are business education lecturers competent in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of male and female business education lecturers on e-business platforms essential for successful entrepreneurship among marketing education graduates in Delta State.
2. Business education lecturers do not significantly differ in their mean ratings on competency level in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State as regards to years of teaching experience.

Methodology

The study adopted a descriptive survey research design. The population of the study comprised 97 business education lecturers in the three Colleges of Education in Delta State; namely: Federal College of Education (Technical), Asaba (72); College of Education, Warri (12) and Delta State College of Education, Mosogar (13). There was no sampling as the population size is manageable. A questionnaire titled:

"Competencies in E-Business Platforms as Requisite for Successful Entrepreneurship Among Marketing Education Graduates Questionnaire (CEBPRSEABEGQ), having two sections 'A' and 'B' was used to generate data. Section 'A' contained information on demographic variable of respondents and section 'B' contained 42-item question statements, structured on a 4-point rating scale and weighted as: Highly Essential (HE, 3.50-4.00), Essential (E, 2.50-3.49), Somewhat Essential (SE, 1.50-2.49), Not Essential (NE, 1.00-1.49) and Highly Competent (HC, 3.50-4.00), Competent (E, 2.50-3.49), Fairly Competent (FC, 1.50-2.49), and Not Competent (NC, 1.00-1.49). The instrument was validated` by two senior lecturers in Business Education and Measurement and Evaluation, Federal College of Education (Technical), Asaba. The reliability of the instrument was ascertained using split-half *method.* The data obtained was analyzed using Cronbach Alpha reliability test which yielded coefficient value of 0.78 indicating that the instrument is reliable. The researcher administered the instrument with the help of two research assistants. Out of the 97 copies of the questionnaire distributed to the respondents, 89 copies (representing 92 percent) were retrieved and used for data analysis. Mean and standard deviation were used to answer the research questions while t-test was used in testing the hypotheses. The decision was to reject the null hypothesis where the t-calculated is equal or greater than the table value; if otherwise, do not reject.

Results

Research Question 1: What are e-business platforms essential for successful entrepreneurship among marketing education graduates in Delta State?

Table 1: Respondents' mean ratings on e-business platforms essential for successful entrepreneurship among graduates N = 89

S/N	The following E-Business Platforms are Essential for Successful Entrepreneurship:	X	SD	Remarks
E-Commerce platforms for Online Stores:				
1.	Shopify	3.63	0.66	Highly Essential
2.	WooCommerce	2.79	0.74	Essential
3.	Big Commerce	3.33	0.65	Essential
4.	Wix	3.20	0.63	Essential
5.	Ecwid	3.21	0.63	Essential
6.	Squarespace	3.58	0.65	Highly Essential
7.	Square Online	3.11	0.67	Essential
8.	Shift4Shop	3.17	0.56	Essential
9.	Magnento	3.17	0.57	Essential

10.	Open Cart	2.14	0.88	Somewhat Essential
11.	Hoot Suite	1.52	0.97	Somewhat Essential
12.	Meta Business Suite	3.25	0.71	Essential
Social Media Marketing Platforms: (for business promotion)				
13.	Facebook Ads	3.94	0.63	Highly Essential
14.	Instagram Ads	3.65	0.67	Highly Essential
15.	TikTok Ads	3.67	0.65	Highly Essential
16.	YouTube Ads	3.72	0.59	Highly Essential
E-Mail Marketing Platforms: (support customer engagement)				
17.	Mailchimp	3.06	0.68	Essential
18.	Semrush	2.09	0.88	Somewhat Essential
19.	Google Ads	3.67	0.65	Highly Essential
Online Service Platforms: (to Sell Skills and Services)				
20.	Freelancer	3.44	0.54	Essential
21.	Fiverr	2.14	0.82	Somewhat Essential
Cluster Mean/SD		**2.95**	**0.69**	**Essential**

Source: Field Survey, 2025

Table 1 reveals that items 1, 6, 13-16 and 19 with mean ratings ranging from 3.58 to 3.94 indicates highly essential. Items 2-5, 7-9, 12, 17 and 20 with mean scores ranging between 2.79 and 3.44 indicates essential. While items 10-11, 18 and 21 with mean scores ranging from 1.52 to 2.14 implies somewhat essential. With the cluster mean of 2.95, it means that the respondents rated the items as e-business platforms essential for successful entrepreneurship among graduates in Delta State. All the standard deviation values are within the same range, showing that the respondents are not wide apart in their ratings.

Research Question 2: To what extent are business education lecturers competent in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State?

Table 2:Mean responses on business education lecturers' competence in the use of e-business platforms in preparation of graduate entrepreneurs N = 89

S/N	Lecturer's Competency Level on E-Business Platforms:	X	SD	Remarks
22.	Shopify	2.14	0.80	Fairly Competent

23.	WooCommerce	1.64	0.37	Fairly Competent
24.	Big Commerce	1.95	0. 91	Fairly Competent
25.	Facebook	3.51	0.74	Highly Competent
26.	Ecwid	1.21	0.62	Not Competent
27.	Squarespace	2.67	0.61	Competent
28.	Wix	1.15	0.53	Not Competent
29.	Square Online	2.01	0.63	Fairly Competent
30.	Shift4Shop	1.97	0.73	Fairly Competent
31.	Instagram	3.44	0.78	Competent
32.	HootSuite	1.15	0.51	Not Competent
33.	Meta Business Suite	1.48	0.69	Not Competent
34.	YouTube Ads	3.78	0.57	Highly Competent
35.	Google Ads	3.42	0.61	Competent
36.	TikTok	3.62	0.58	Highly Competent
37.	Mail Chimp	1.64	0.80	Fairly Competent
38.	Magnento	1.17	0.43	Not Competent
39.	Semrush	1.21	0.62	Not Competent
40.	Fiverr	1.13	0.51	Not Competent
41.	Google Workspace	3.35	0.72	Competent
42.	Freelancer	2.56	0.61	Competent
Cluster Mean/SD		**2.20**	**0.64**	**Fairly Competent**

Source: Field Survey, 2025

Table 2 shows that items 25, 34 and 36 with mean scores ranging from 3.51 to 3.78 indicates highly competent. Items 27, 31, 35, 41 and 42 with mean scores ranging between 2.56 and 3.44 implies competent. Items 22-24, 28-29 and 36 having mean scores ranging from 1.64 to 2.14 indicates fairly competent. While items 26, 28, 32-33 and 38-40 having mean scores ranging between 1.13 and 1.48 implies not competent. With the cluster mean of 2.20, it means that business education lecturers are fairly competent in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State. The standard deviation values are within the same range, indicating homogeneity in respondents' ratings.

Testing of Hypotheses

Ho_1: There is no significant difference in the mean ratings of male and female business education lecturers on e-business platforms essential for successful entrepreneurship among marketing education graduates in Delta State

Table 3: Summary of t-test analysis of the mean ratings of male and female business education lecturers on e-business platforms essential for successful entrepreneurship among marketing education graduates

Gender	N	Mean	SD	df	Alpha	t-Cal	t-Crit.	Decision
Male	47	3.22	0.27					
				87	0.05	0.38	1.96	
Accept								
Female	42	3.31	0.43					

Table 3 reveals that the calculated t-value of 0.38 is less than the critical t-value of 1.96 at 87 degree of freedom (tcal = 0.38 $\leq$ tcrit = 1.96). This implies that the null hypothesis of no significant difference was accepted. It means that male and female business education lecturers do not significantly differ in their mean ratings on e-business platforms essential for successful entrepreneurship among marketing education graduates in Delta State.

Ho2: Business education lecturers do not significantly differ in their mean ratings on competency level in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State as regards to years of teaching experience

Table 4: Summary of t-test analysis on the mean ratings of more experienced and less experienced business education lecturers on competency level in the use of e-business platforms in preparation of graduate entrepreneurs.

Years of Experience	N	Mean	SD	df	Alpha	t-Cal	t-Crit	Decision
Above 10 years	61	3.49	0.53					
				87	0.05	0.62	1.96	
Accept								
1-10 years	28	3.37	0.51					

Table 4 reveals that the calculated t-value of 0.62 is less than the critical t-value of 1.96 at 0.05 level of significance (tcal = 0.62 $\leq$ tcrit = 1.96). This implies that the hypothesis of no significant difference is accepted. It means that, there is no statistically significant difference in the opinions of business education lecturers on their competency level in the use of e-business tools and platforms in preparation of graduate entrepreneurs in Delta State in respect to years of teaching experience**.**

Discussion of Findings

The study in respect to research question one determined e-business platforms essential for successful entrepreneurship among graduates in Delta State. The study found that the respondents rated Shopify, Squarespace, Facebook, Instagram, TikTok and Google Ads are highly essential. WooCommerce, Big Commerce, Wix, Ecwid, Square Online, Shift4Shop, Magnento, MetaBusiness Suite, Mailchimp and Freelancer were rated as essential. While Open Cart, Hoot Suite, Semrush and Fiverr were somewhat essential. The finding aligns with the submissions of Barney, Pratt and Cole (2025), that customers expect organizations to provide self-service options to conduct transactions, personalized experiences and speedy secured transactions. Adewuyi and Onuoha (2022) asserts that in Nigeria where traditional market reach could be expensive and inaccessible for small businesses, Instagram provides a free and efficient alternative. Little wonder, many Nigerian entrepreneurs resort to advertising their products and take orders directly through the App, thereby reducing the expenses of physical stores. Furthermore, the study found no significant difference in the opinions of male and female business education lecturers on e-business platforms essential for successful entrepreneurship among marketing education graduates in Delta State. The finding contradicts the report of Okoli and Okolo (2024) that gender significantly influenced business educators' rating of entrepreneurial skills needed for effective implementation of office education curriculum in colleges of education in South-South, Nigeria. The findings from the present study implies that male and female business education lecturers altogether perceived competencies in e-business platforms essential for successful entrepreneurship among marketing education graduates in this digital age.

The study further ascertained that business education lecturers are fairly competent in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State. The result showed that business education lecturers in colleges of education in Delta State are highly competent in Facebook, YouTube and TikTok. They are competent in Squarespace, Instagram, Google Ads, Google Workspace and Freelancer. They are fairly competent in Shopify, Big Commerce, WooCommerce, Square Online, Shift4Shop and Mail Chimp. While they lack competence in Wix, Ecwid, Magnento and MetaBusiness amongst others. Lending credence to Federal Republic of Nigeria (FRN, 2013), that colleges of education would provide

knowledge, skills and training to students for the production of teachers and skilled personnel who shall be enterprising and self-reliant; business education lecturers have the responsibility to be digitally competent themselves for successful transfer of skills to would be graduates to practice e-business as entrepreneurs. Thus, possessing competencies to effectively and efficiently utilize e-business platforms is vital in shaping the future of business education and marketing education graduates in today's digital economy. More so, the result of hypothesis two showed no significant difference in the opinions of business education lecturers on their competency level in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State with respect to years of teaching experience.

Conclusion

Based on the findings of the study, it was concluded that Shopify, Squarespace, Facebook, Instagram, TikTok and Google Ads, WooCommerce, Big Commerce, Wix, Ecwid, Square Online, Shift4Shop, Magnento, MetaBusiness Suite, Mailchimp and Freelancer are essential e-business platforms for marketing education graduates' entrepreneurship in Delta State. Furthermore, business education lecturers rated themselves fairly competent in the use of e-business platforms in preparation of graduate entrepreneurs in Delta State.

Recommendations

1. The National Commission for Colleges of Education (NCCE) should incorporate the essential e-business tools and platforms into the curriculum of Nigeria Certificate in Education (NCE) during curriculum review.
2. Business education lecturers should embark on self-sponsored training to acquire needed e-business competencies that would enable them utilize e-business platforms/tools in preparation of prospective enterprising self-reliant graduates.
3. Management of Colleges of Education should create enabling environment adequate for students' practical experiences on e-business platforms/tools that would make them competent in applying them in their future businesses on graduation.

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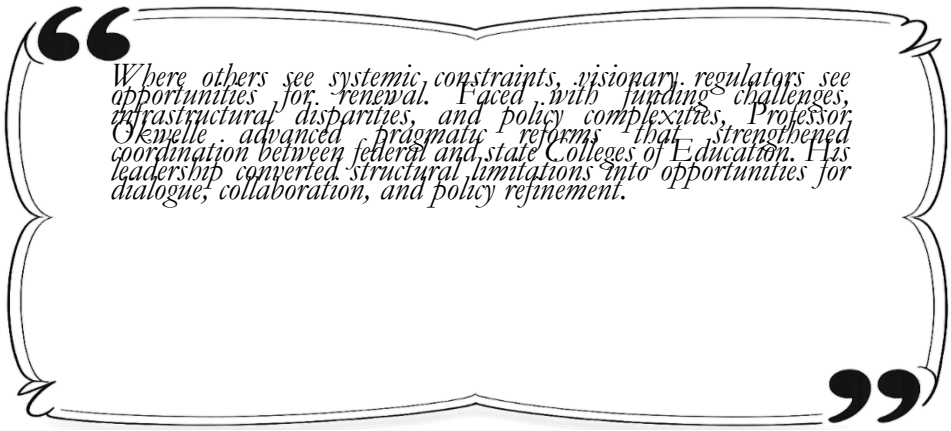
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PART FOUR

From Knowledge to Power: Tackling Education's Most Pressing Challenges

> *Education is key to national development; not just access to schools, but education that engages minds,, fosters creativity, and prepares young people for gainful enterprise.*
>
> **Peter Okebukola**

Part Four, "From Knowledge to Power: Tackling Education's Most Pressing Challenges," examines the transformative potential of education as the driving force for individual empowerment, societal progress, and national development. As Emeritus Professor Peter Okebukola aptly notes, "Education is key to national development; not just access to schools, but education that engages minds, fosters creativity, and prepares young people for gainful enterprise." This underscores a fundamental truth: knowledge alone is insufficient. True power arises when learning is applied—when education equips learners with critical thinking, problem-solving skills, creativity, and the capacity to innovate. In this section, we confront the most urgent challenges facing education today, from inadequate infrastructure and outdated curricula to skills gaps and the need for relevance in the 21st-century economy. Beyond diagnosing these issues, this part illuminates practical pathways for reform, innovation, and excellence—demonstrating how education can not only uplift individuals but also catalyse economic growth, social equity, and national transformation. By exploring emerging trends, evidence-based strategies, and success stories, Part Four positions education as a powerful lever for empowerment, bridging the gap between knowledge and meaningful action. It challenges educators, policymakers, and stakeholders to reimagine learning, embrace innovation, and ensure that every learner is prepared to thrive, contribute, and lead in a rapidly changing world.

If humility is his hallmark, then a loyal heart is his engine. Professor Paulinus Okwelle possesses what can only be called an elephant's memory—a memory that meticulously catalogues acts of kindness, support, and fellowship, no matter how small or distant in the past. He never forgets. He carries with him a mental ledger of goodwill, not for accounting, but for reciprocation. He goes out of his way to reward and acknowledge those who have crossed his path with kindness. This could be a word of encouragement offered decades ago, a professional courtesy extended during challenging times, or simply the camaraderie of shared struggle.

Obiajulu Loretta Obierika

Chapter 14

A Legacy of Excellence through Purposeful Accreditation Exercises in Teacher Education

Faruk Rashid Haruna
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Abstract

This paper examines how methodical accreditation processes can create a lasting legacy of quality in teacher education institutions. Rather than focusing solely on standard compliance requirements from the National Commission for College of Education (NCCE), the paper contends that an organized accreditation program can function as a formidable driver for institutional growth, professional responsibility, and continuous quality enhancement. By examining academic literature related to the effectiveness of College of Education (COE), global teacher preparation, curriculum coordination, evaluation methods, liberating educational approaches, mental health considerations, and policy integration, the research illustrates that accreditation, when executed with clear purpose, embeds quality assurance within the educational culture of teacher training programs. Primary results indicate that strategic accreditation cultivates excellence through multiple connected pathways: developing an environment of investigation and ongoing enhancement, maintaining curriculum consistency that aligns with professional benchmarks, supporting COE advancement and research, integrating international and locally-relevant viewpoints, applying research-based evaluation of learner achievements, and encouraging collaboration across different sectors. The research determines that when accreditation is pursued with deliberate planning and strategic foresight—rooted in thoughtful practice, curriculum coordination, development of COE, varied educational approaches, evidence-informed assessment, and policy alignment—it moves beyond administrative requirements to become an active influence that shapes institutional character, strengthens public confidence, and ensures teacher preparation programs continue to address changing educational and community demands. This evolution creates not simply regulatory compliance but a lasting tradition of excellence in developing future teaching professionals.

Keywords: *Accreditation, Teacher Education, Colleges of Education, NCCE*

Introduction

Since its establishment in 1989, the NCCE has being playing key roles in the formation of Teacher Education in Nigeria. Among such roles is the accreditation of Teacher Education programs in Nigeria, to sustain high academic standards. Through NCCE guidelines, teachers are adequately trained to meet up with potential classroom challenges, and the accreditation exercise is a pivotal program in ensuring institutional qualification in the Teacher Training task (Disciplines in Nigeria, 2025).

Institutions dedicated to preparing teachers hold a pivotal role in influencing educational standards, community progress, and international competitiveness. When accreditation processes are implemented with intention rather than routine compliance, they function as effective tools for organizational transformation, professional responsibility, and continuous excellence. The NCCE has Created an enduring tradition of quality in teacher education that extends beyond simply gathering compliance documentation; but also the intentional coordination of standards, teaching methods, growth of COE teachers, student achievements, and community requirements. Based on research examining COE performance, teacher preparation, curriculum creation, integration and review, teacher assessment, and policy coordination, this study contends that purposeful accreditation processes promote lasting excellence by integrating quality assurance into the scholarly environment of Colleges of Education.

Accreditation as an Organizational Culture Development Process

NCCE is tasked with the critical task of accrediting Teacher Education programs in Nigeria, and this it does following a rigorous observance of the following standards and requirements; the assessment of the curriculum of Teacher Education programs to ascertain their alignment with national educational objectives and standards, evaluate the qualifications, experience, and expertise of COE teachers in their respective fields of education, assessment of the adequacy of learning infrastructure for effective learning, and the evaluation of the teaching methodologies and approaches of teachers according to global best practices and contemporary educational trends (Disciplines in Nigeria, 2025).

Since organized accreditation exercise goes beyond periodic NCCE reviews to become an ongoing internal mechanism for self-examination and enhancement of COE faculty members; it is vital to underscore that academic achievement and longevity require strategic planning, research-supported methods, and thoughtful professional development. When accreditation is conceptualized as a growth-oriented rather than disciplinary process, institutions develop an environment of investigation, partnership, and responsibility among teaching staff and management of COE.

Within teacher education, this culture-developing function of accreditation holds particular significance since educators demonstrate professional standards for prospective teachers. Accreditation requirements prompt institutions to define their purpose, express program goals, and methodically evaluate instructional effectiveness, thus establishing the groundwork for an excellent reputation built upon collective institutional principles.

Okwelle's Oversight of Curriculum Coordination, Standards, and Professional Implementation

As part of its primary function to "Collate, analyze and publish any information relating to teacher education in Nigeria", and in tandem with the philosophy that **"no education can rise above the quality of its teachers …."** of the National Policy on Education, the NCCE has been conducting accreditation exercises regularly for educational institutions in Nigeria, and recently released the list of accredited colleges of education in Nigeria, numbering 83 registered (Nana Aishat Memorial College of Education, 2022, Chukwu, 2025). This, and the identification and publication of the names of "…illegal Colleges of education and mushroom study centers in the country" on National dailies and NCCE's official website, underscores the pivotal duties of NCCE as overseer of the accreditation, regulation and standardization of Teacher Education in Nigeria, and entrenches the commission's slogan "**Quality Teacher – Pride of the Nation"** (**National Commission for Colleges of Education, 2021, NCCE, 2025).**

Under the watch of Professor Paulinus Chijioke Okwelle, as the 6th substantive Executive Secretary of the NCCE, since April 20, 2021 when he assumed office, till date, there have been "a monumental turn-around and improved recognition of the programs", as well as a phenomenal growth in NCE awarding institutions at Federal, State and Private levels, among other landmark achievements. In addition, Okwelle prioritizes the participation of NCCE staff in the commission's main focus of accrediting courses according to its guidelines, inspecting resources, and updating the NCE Minimum Standards. In fact, a review of the NCE Minimum Standards is currently underway **(**National Commission for Colleges of Education, 2021, NCCE 2025).

Accreditation contributes to excellence and consistency in Teacher Education, especially when stakeholders understand the significance of developing pertinent educational goals that guarantee uniformity, academic rigor, and correspondence with professional standards. Within teacher education, accreditation-guided curriculum organization ensures that teaching knowledge, content expertise, and practical skills are methodically cultivated throughout coursework and field placements (Simonson, 2007). Resource inspection, institutional and program accreditation and laying down Minimum Standards guidelines for the NCE program are among the primary functions of the NCCE Management. Hence, under Okwelle's

leadership in 2021, the commission accredited 22 Colleges of Education and 1 Polytechnic that offers NCE programs.

Kammer (2019) contends that teacher monitoring and evaluation must directly correspond with intended classroom behaviors. Purposeful accreditation supports this correspondence by demanding that evaluation frameworks reflect institutional objectives, teaching criteria, and student-based approaches. Through this coordination, accreditation exercise enhances the credibility of teacher preparation programs and guarantees that NCE graduates are adequately prepared for classroom environments and professionally qualified.

College of Education Development and Institutional Excellence

The caliber of COE teachers plays a pivotal role in achieving successful accreditation results. Mentoring, strategic scholarship, and professional involvement contribute to academic excellence. The accreditation process frequently encourages institutions to prioritize the advancement of COE, research output, and creative teaching methods, which ultimately improves instructional quality and strengthens institutional standing.

Additionally, Omar et al. (2020) illustrate that educators' capabilities emerge from a comprehensive integration of knowledge, skills, and attitudes. Accreditation criteria that prioritize ongoing professional growth ensure that teacher educators demonstrate these capabilities themselves, promoting excellence through exemplary practice and guidance.

Global, Emancipatory, and Place-Based Perspectives

Within today's interconnected environment, accreditation systems must facilitate the development of globally skilled educators. Vieira and Cruz (2022) stress the necessity of training teachers capable of addressing international concerns, cultural variation, and civic responsibility. Meaningful accreditation incorporates these global capabilities into program objectives, curriculum structure, and evaluation methods.

The advertisements in recent times for teaching opportunities for Nigerian teachers in the United Kingdom (Pengman, 2025), is testament to the need of Nigerian teachers to be trained according to international best practices to address international concerns and needs. Nigeria could among other expertise, export quality teachers abroad, just as several other African countries in Africa such as Kenya, who plans to export a whopping 350,000 teachers to USA and Germany, among other countries (Chipuko Digital, 2025).

This greatly underscores accreditation programs that ensure that teachers are trained as global professionals with possibility of career growth beyond the shores of Nigeria.

The significance of place-centered and belonging-focused methods in teacher preparation. Accreditation that prioritizes contextual significance enables institutions to incorporate local understanding, cultural backgrounds, and community involvement into teacher training programs. Liberating instructional methods strengthen learners and promote critical awareness. Moreover, there are better educational outcomes when teachers are resourceful enough to "…incorporate interactive teaching strategies together with technology support and cultural pedagogies." (Sherfinski, 2023, Arowolo-Ayodeji et al., 2025). When accreditation acknowledges these teaching methodologies, it encourages transformative educational practices rather than uniform standardization.

Evidence-Based Accreditation and Learner Outcomes

Accreditation of COE in Nigeria is evidence-based. This is to say that requirements for passing accreditation of resource and staff must be available and sighted by the designated Accreditation team, who are generally led by a Team Leader furnished with a checklist of the necessary materials and personnel for the efficient formation of teachers.

NCCE's modus operandi for monitoring and evaluation of teacher education programs is elaborately spelt out in this submission of Disciplines in Nigeria (2025) thus;

NCCE plays a crucial role in monitoring and evaluating teacher education institutions in Nigeria to ensure that they adhere to the set standards. NCCE conducts regular inspections of teacher education institutions to assess their compliance with guidelines. Through these inspections, NCCE identifies areas where institutions may be lacking and need improvement. NCCE also reviews the curriculum and teaching methods used by teacher education institutions to ensure relevance and quality. By monitoring these aspects, NCCE can make recommendations for enhancements to better prepare future educators.

A fundamental characteristic of organized accreditation is its foundation on empirical data based on evidence. Diagnostic assessments in teacher preparation can guide curriculum enhancement and policy transformation and improve learning outcomes (Noushad 2024). Accreditation processes that employ such information encourage transparency, standardization, and ongoing development, thus enhancing institutional reputation.

Aspects of accreditation include student interviews, which give feedback on the quality of teachers and nurturing in the training programs. This is also to ensure that

students learn in conducive environment free of psychological challenges from teachers. Neil-Sztramko et al. (2021) reveal that psychological elements including anxiety, self-confidence, and well-being substantially affect student achievement. Accreditation criteria that mandate student support systems, inclusive educational settings, and comprehensive assessment approaches contribute to enduring quality by addressing both scholastic and non-scholastic factors of success.

In this wise, teachers are also required to teach lessons, while accreditors observe and note adherence to pedagogical approaches and methodologies, balanced on the right ethics of teacher education.

Policy, Technology, and Multisector Collaboration

The governmental aspects of educational transformation, encompassing technology implementation, are inseparable from accreditation mechanisms. Technology education carries inherent political dimensions, influenced by authority structures and community values. Purposeful accreditation guarantees that technological advancements in teacher preparation are educationally valid, morally founded, and socially conscious.

Aside technophobia, another challenge to the incorporation of technology is the cost of pedagogical gadgets. Contemporary technological advancement in education require government bailouts in the public schools. Most public schools do not possess an ICT Centre, and where they do, the equipment are either obsolete or not working. There is a need for total revamp in this sector of education. Many of the COE fail accreditation due to lack of standardized ICT and Educational Technology centers, Electronic libraries and language laboratories, among other technological resource centers.

There is a need for strategic cooperation of stakeholders such as policy developers, instructors, healthcare practitioners, and local communities, and especially government in ensuring qualitative education. Accreditation that promotes alliances and inter-sector involvement enhances teacher preparation programs and amplifies their community influence.

Distinguished teacher education programs achieve greatness not through mechanical compliance with accreditation requirements, but through deliberate, genuine, and forward-thinking participation in accreditation as a comprehensive institutional transformation. This research has shown that when accreditation activities are undertaken with clear purpose, they exceed their conventional function as external oversight tools and develop into significant drivers of continuous organizational enhancement, professional distinction, and educational advancement.

The findings presented in this examination indicate that purposeful accreditation functions across several interrelated aspects. It develops an institutional atmosphere

marked by thoughtful investigation, cooperative participation, and collective accountability among educators and administrators. It establishes curricular consistency by connecting course goals, teaching methods, and evaluation systems with both professional requirements and the actual conditions of classroom instruction. It emphasizes the growth of COE through guidance, academic achievement, and creative teaching approaches, acknowledging that teacher educator quality directly influences the standard of prospective teachers. It incorporates international competencies while respecting location-specific knowledge and community settings, developing educators who are both globally informed and locally engaged. It utilizes research-informed assessment to guide ongoing enhancement and policy development, while considering the emotional and comprehensive aspects of student achievement. Additionally, it encourages significant partnerships across different sectors, combining technological advancement with educational effectiveness and social awareness.

When these components unite through purposeful accreditation methods, teacher preparation institutions establish a unique character founded on distinction rather than simple adherence to requirements. The accreditation process becomes integrated into the institutional culture, influencing professional standards, directing everyday activities, and steering strategic planning. COE teachers move from perceiving accreditation as an external burden to welcoming it as a chance for professional development and program improvement. Students receive benefits from consistent, demanding, and adaptive curricula that thoroughly prepare them for the challenges of modern teaching. Communities obtain access to well-trained educators equipped to address varied learning requirements and support social advancement.

In essence, purposeful accreditation in teacher preparation signifies a dedication to continuous transformation rather than fixed accomplishment. It recognizes that distinction is not an endpoint but an ongoing process requiring attention, adjustment, and revitalization. As educational environments change, social requirements evolve, and understanding grows, teacher preparation institutions must stay flexible and adaptable. Deliberate accreditation offers the structure and drive for this constant development, guaranteeing that teacher education programs not only satisfy present standards but prepare for future requirements and influence developing educational models.

The tradition of distinction created through purposeful accreditation reaches beyond single institutions to impact the wider educational system. Properly accredited teacher preparation programs strengthen public trust in the teaching profession, raise educational standards throughout school networks, and support national effectiveness in an increasingly connected world. They develop educators who are not simply technically skilled but professionally devoted, culturally aware, and

intellectually active—teachers able to motivate learning, encourage critical thinking, and guide the future generation of citizens.

Therefore, when teacher education institutions engage with accreditation through purpose, genuineness, and strategic perspective, they establish something much more significant than compliance records. They construct lasting traditions of distinction that reshape institutional culture, progress the teaching profession, and eventually enhance educational results for all students. This transformation demands continuous dedication, cooperative work, and steadfast attention to quality, but the benefits—for institutions, educators, students, and society—make the effort not only valuable but necessary. Through such careful and meaningful participation in accreditation processes, teacher education institutions accomplish their core purpose: developing outstanding educators who will influence the future through their expertise, commitment, and transformative influence in classrooms and communities globally.

A tradition of distinction in teacher education develops when accreditation processes are conducted with intention, authenticity, and foresight. Founded on contemplative practice, curriculum coordination, and instructor advancement, international and liberating viewpoints, data-driven assessment, and policy consistency, purposeful accreditation converts quality assurance into a catalyst for institutional distinction. Instead of serving as an administrative requirement, accreditation evolves into a dynamic process that influences professional character, enhances public confidence, and guarantees that teacher preparation institutions remain adaptable to changing educational and community demands. Through such deliberate participation, accreditation achieves not merely conformity but an enduring tradition of distinction in teacher education.

Recommendations for Stakeholders in Teacher Education

Drawing from the study's findings concerning the development of enduring excellence through deliberate accreditation processes in teacher education, the following suggestions are presented to key participants in the teacher education framework:

For Teacher Education Institutions

Integrate Accreditation into Organizational DNA. Educational institutions should transcend the perception of accreditation as an intermittent occurrence and incorporate quality enhancement practices into everyday operations, governance structures, and strategic planning. Creating persistent self-evaluation frameworks, routine program assessments, and perpetual enhancement processes will cultivate an environment of distinction that endures across accreditation periods.

Commit to extensive enhancement of COE. Colleges of Education must emphasize structured development initiatives that comprise guidance for teacher education,

assistance for research productivity, provisions for educational ingenuity, and paths for leadership advancement. Academic staff require resources, time allocation, and motivations to participate in research activities, engage in interdisciplinary collaboration, and persistently enhance their instructional methods.

Harmonize Curriculum with Standards and Local Context. While preserving conformity with national and professional benchmarks, institutions must guarantee that academic programs represent regional community requirements, cultural environments, and location-specific knowledge. Curriculum construction should be cooperative, engaging teachers, active educators, community representatives, students and other stakeholders to ensure applicability and adaptability.

Develop Comprehensive Information Systems. Colleges should create thorough data gathering and evaluation mechanisms that monitor student advancement, program achievements, graduate performance, and improvement areas. These frameworks should guide curriculum modifications, teaching enhancements, and strategic planning while supporting accreditation documentation.

Build Complete Student Support Networks. Beyond academic training, institutions must implement assistance systems addressing students' mental health, confidence building, professional identity formation, and personal development. Counseling resources, peer guidance, financial support, and wellness initiatives enhance student achievement and persistence.

For NCCE

Establish Standards that Encourage Innovation

Accreditation criteria should highlight development, creativity, and ongoing enhancement rather than simple conformity. Guidelines should motivate institutions to cultivate unique capabilities while fulfilling fundamental expectations, permitting varied approaches to excellence.

Include Global and Liberation-Oriented Viewpoints

Accreditation structures should explicitly examine international competencies, cultural sensitivity, social equity, and liberating educational approaches. Requirements should demand proof that programs equip educators to function successfully in varied environments and confront educational disparities.

Emphasize Impact Evidence over Documentation Quantity

Accrediting organizations should focus on substantial proof of program success, student achievement, and graduate influence rather than extensive paperwork. Simplified procedures concentrating on results rather than processes will minimize compliance responsibilities while preserving academic rigor.

Offer Continuous Assistance and Professional Growth

Accreditation organizations should supply regular education, materials, and guidance to institutions during the entire accreditation period, not exclusively during official evaluation phases. This assistance enables institutions to comprehend requirements, apply effective practices, and address difficulties proactively.

Establish Practice Communities

Accrediting organizations should create networks enabling institutions to exchange innovations, tackle shared challenges, and benefit from collective experiences. These communities advance field-wide progress beyond individual institutional enhancement.

For Policy Makers

Coordinate Policies across Educational Tiers

Educational policies must be synchronized across teacher preparation, and continuous professional development to guarantee consistency in expectations, standards, and support mechanisms. Disconnected policies weaken teacher education program effectiveness.

Provide Sufficient Teacher Education Funding

Governments must allocate adequate resources for teacher preparation programs, including COE research support, program innovation, student financial aid, clinical partnerships, and facility development. Excellence in teacher education demands sustained financial commitment.

Promote Thoughtful Technology Implementation

Technology-promoting policies should ensure educational tools are pedagogically appropriate, culturally suitable, and equitably available. Technology should supplement rather than substitute effective teaching methods and human connections.

Promote Inter-Sector Partnerships

Policy structures should motivate collaboration among teacher education institutions, school systems, community groups, healthcare organizations, and other participants. Collaborative methods address complex educational challenges more successfully than independent initiatives.

Apply National Evaluations for Enhancement Purposes

While preserving accountability, national teacher evaluations should primarily inform program improvement, curriculum updates, and policy formulation rather than penalize or rank institutions negatively.

For COE Management and Staff

COE management and staff should **participate genuinely in accreditation, and** perceive the exercise as an occasion for professional reflections, program improvement, and scholarly investigation rather than solely an administrative responsibility. Active involvement in self-evaluation processes enhances professional practice and strengthens programs.

They should demonstrate lifelong learning. Teacher educators must exhibit the same dedication to continuous improvement, reflective practice, and professional advancement they require from students. This demonstration reinforces professional standards and improves program quality.

Combine Theory, Practice, and Research. Colleges should ensure coursework connects theoretical understanding, practical implementation, and current technological trends and research discoveries. Strong college and community partnerships enable genuine clinical experiences and applied research possibilities, hence the relationship of the gown with the town should be cordial and progressive.

Promote Student Independence and Critical Awareness. Programs should utilize liberating teaching methods that enable students to think analytically, challenge assumptions, promote equity, and become transformation leaders in future schools and communities.

Record and Share Innovations. Colleges should systematically document successful practices, creative approaches, and program enhancements, distributing findings through publications, presentations, and professional networks to benefit the broader teacher education field.

For Prospective and Current Teacher Education Students

Participate Completely in Professional Training. Students should approach teacher education with dedication and commitment, utilizing all learning opportunities including coursework, clinical experiences, professional associations, and additional activities that strengthen professional development.

Offer Constructive Input. Students should actively engage in program assessment processes, providing honest feedback regarding curriculum effectiveness, teaching quality, support services, and improvement areas. Student viewpoints are essential for program enhancement.

Cultivate Global and Local Understanding. Future teachers should develop both international competencies and thorough knowledge of local communities, understanding that effective teaching requires awareness of diverse viewpoints and specific contextual information.

Emphasize Personal Health. Students should monitor their mental health, seek assistance when necessary, and establish sustainable stress management and balance practices. Personal wellness forms the foundation for professional success.

Establish Professional Connections. Students should connect with colleagues, mentor educators, and professional organizations to create supportive networks sustaining them throughout their careers.

Conclusion

The aforementioned suggestions are interconnected and mutually supportive. Significant advancement toward establishing legacies of excellence in teacher education demands coordinated efforts across all participant groups. Institutions cannot change independently; they require supportive policies, reasonable accreditation standards, sufficient resources, and committed lecturers and students. Similarly, progressive policies have restricted influence without institutional capability and implementation commitment.

Although the NCCE has been doing an impressive job so far, yet the implementation of the guidelines of efficient teacher education must be strategic and gradual, acknowledging that lasting change requires time and involves building capacity, transforming culture, and proving value. Professor Okwelle since his assumption in office has contributed his quota to the development of teacher education in Nigeria, albeit impressively. However, institutions should evaluate their present condition from the feedback from their last accreditation exercise, and establish priorities, create action plans with specific timelines and responsibilities, and consistently assess their progress towards the desirable goals of excellence. Acknowledging small achievements while maintaining focus on long-term objectives helps sustain energy through challenging institutional transformation work. Hence, the NCCE deserves a pat on the back for the journey so far, towards a globally acclaimed teacher education accrediting body.

Finally, pursuing excellence through deliberate accreditation extends beyond technical or administrative efforts to become a deeply professional and ethical undertaking. It demonstrates commitment to preparing the finest possible teachers for students who merit excellent education. When all participants embrace this shared responsibility with purpose, authenticity, and vision, excellence in teacher education becomes not merely an aspiration but a reality that transforms lives, strengthens communities, and advances societies.

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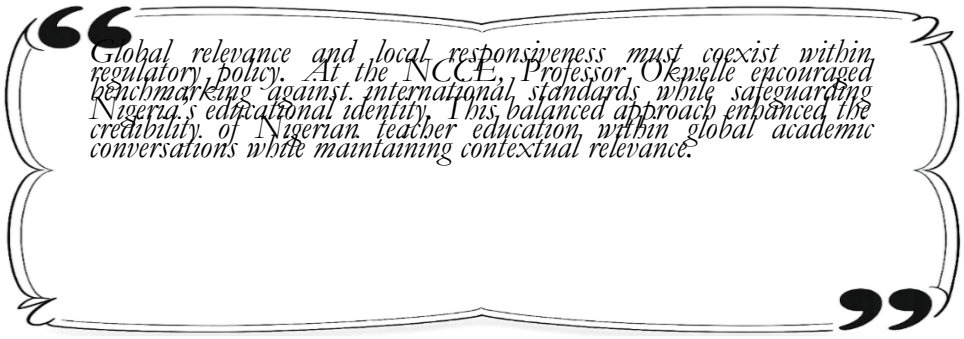
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Author's Biodata

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Chapter 15

Relevantising Islamic Ethical Principles to Mentorship and Teacher Professionalism in Nigeria

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Abstract

Ever since the exit of the colonial master from the shore of Nigeria, numerous approaches have been adopted to ensure that teaching as a profession attains an enviable position. A series of agencies has also been established to ensure professionalism and strong mentorship in Nigeria's education system. Despite these attempts, it seems the nation is yet to achieve its goals of improving teacher quality, student learning outcomes, and institutional effectiveness, hence the need for improvement on the existing strategies as well as alternative steps to achieve this. Being a country with a strong interest in religion, we proposed that religious ethical values and principles would, in no small measure, help drive the country's education setup in the right direction, achieving teacher professionalism and mentorship, which are integral components of quality education. In the religious parlance, teachers are entrusted with dual roles of imparting knowledge and nurturing moral and spiritual character. This paper explores mentorship and teacher professionalism from the Islamic perspective, drawing on Qur'anic teachings, Prophetic traditions, classical Islamic scholarship, and historical educational practices. It argues that Islam provides a holistic ethical and pedagogical framework that remains relevant for contemporary educational systems. It concludes that the inclusion of Islamic ethical values in the curriculum of teacher education could be a potent step towards attaining teacher professionalism in Nigeria.

Keywords: *Mentorship, Islamic Ethics, Teacher, Professionalism, Nigeria.*

Introduction

The assertion that no nation can rise above its education system makes the government of Nigeria at different levels to prioritise its education system for its development. As such, different measures are put in place to ensure national growth and development through education. Several reforms, policies, and initiatives have been implemented across federal, state, and institutional levels to ensure professionalism and strong mentorship in Nigeria's education system. This is so because the driver of the education, namely the teacher, is crucial to these policies. These steps can be grouped into policy frameworks, capacity building initiatives, school-based mentorship systems, professional regulation, and technological innovations.

To ensure mentorship and professionalism in the Nigerian education sector, a bold step was taken through strengthening policy and regulatory frameworks, like the establishment of the Teachers Registration Council of Nigeria (TRCN), which plays a central role in professionalizing teaching. The body certifies and licenses teachers, setting minimum standards for teacher education programmes; enforcing ethical codes of practice, and as well conducting Professional Qualifying Examinations (PQE) to ensure teacher competence. TRCN enforces ethical guidelines covering classroom discipline, student–teacher relations, professional confidentiality and personal behaviour and integrity.

Ministries of Education have been partnering with different Non-Governmental Organizations (NGOs) and International Bodies like the UNICEF, UNESCO, and British Council, in programmes to provide and support mentorship, by training teachers in child-centred pedagogies, leadership training for school administrators, and professional forums for teacher development. There are also a good number of local NGOs and professional associations like the Nigeria Union of Teachers (NUT), Mathematics Association of Nigeria (MAN), Reading Association of Nigeria (RAN), and the Nigeria Association of Teachers of Arabic and Islamic Studies (NATAIS) which run mentorship workshops and provide professional guidance. One cannot also rule out the services rendered by some regulatory agencies like the National Commission for Colleges of Education (NCCE) and the National Universities Commission (NUC). These bodies provide minimum standards, and update curriculum standards, including teaching practice supervision as structured mentorship, courses on professional ethics, classroom management, and reflective practice and criteria for appointing qualified and experienced academic mentors. All these are an attestation to the fact that Nigeria has taken multiple, multi-level steps to strengthen mentorship and professionalism in its education sector.

However, despite the numerous reforms in teacher education, structured induction, continuous professional development, ethical guidelines, and international partnerships, all which are prerequisites for the nation to progressively build a more

professional, mentored, and competent teaching workforce, the profession is still being faced with some ugly challenges particularly on the part of some bad eggs who are rubbishing the profession by their unprofessional attitudes. It therefore becomes pertinent to look for alternative means through which teaching as a profession regains its lost glory and becomes one of the sought-after professions in the country.

Instances of unprofessionalism among teachers

Teaching is a noble profession governed by ethical standards such as integrity, competence, discipline, and commitment to learners' welfare. However, like other professions, cases of unprofessional conduct have been reported among some teachers. These acts undermine educational quality, public trust, and the moral authority of the teaching profession. A few of these professional misconducts are discussed here.

i. Unethical Behaviours Oriented to Economic Return:

A manifestation of unprofessionalism is the exploitation of students through illegal levies and compulsory sale of handouts. According to Adeyemi (2014), some teachers force students to purchase lecture notes, popularly called 'hand-out' or textbooks, as a condition for passing courses. Cases of students' protests in public tertiary institutions against lecturers who **force them to buy handouts**, textbooks, or pay unofficial fees have been properly documented by scholars. Some teachers also demand money for project supervision, attendance marking, or continuous assessment scores. This commercialisation of education contradicts the ethical principle of **service above self-interest** and worsens inequality among students. This practice disproportionately affects students from low-income backgrounds and contradicts the ethical principle of fairness. It also reduces education to a transactional activity rather than a public good (Ogunyemi, 2019).

Teachers embark on illegal extortion from their students using different methods, one of which is private tutoring and financial interest. In cities and towns across the country, tutoring, extramural classes and coaching centres are springing up daily. This is a case where some teachers give private tutoring to their students and encourage them to get private tutoring by telling parents that their children need extra coaching and assistance. While this step may be commendable; some teachers have gone extra mile to deliberately score down their students so as to force them attend their coaching classes, while some willingly decide to delay covering their course contents during the school hours so as to cover it in their coaching classes. Some adopt asking difficult questions in examinations, causing the grades of students to be low, to be able to persuade them to get private tutoring. As if that was not enough, some of them compensate the students who patronise their private tutoring by increasing their grades and scores, and lowering the grades of students who do not receive private tutoring. They do engage in various manipulative behaviours to

ensure their students do not stop taking private tutoring from them (Demirbilek, 2023).

Another form of extortion of students by teachers is through the collection of illegal and unofficial fees. A good example of this is the recent demotion of two school principals in Anambra State in December 2025. They were guilty of illegal collection of charges from their students and were directed to *refund all monies collected* and step aside for their vice to act as heads. In **previous cases,** multiple *headteachers and principals have been demoted or suspended* for similar violations, such as charging illegal levies, fees for cleaning services, or unapproved materials, prompting warnings from education officials that non-compliance would attract **strict sanctions**.

ii. Sexual abuse and violations against female students

Sexual violations against female students have been rampant in the education sector at virtually all levels. There have been several documented cases where teachers have used threats of academic penalty or physical force to coerce students. Sexual harassment and "sex-for-marks" scandals represent grave ethical violations within Nigerian educational institutions. Studies by Aluede (2017) and Amnesty International (2018) reveal widespread abuse of power by some teachers and lecturers, particularly against female students.

In a survey carried out by Owoaje & Taiwo (2010), **69.8%** of female graduates surveyed reported they had been sexually harassed while in tertiary institutions; **48.2%** experienced the **physical type** of harassment, like unwanted touching, while **57.8%** experienced **verbal comments** (non-physical harassment). In the same vein, a similar study was carried out by Ayeobasan (2025) on the level of prevalence of sexual harassment in Lagos State tertiary institutions. It revealed an extremely high prevalence of 84.6% in universities,90.8% in colleges of education, and 44.6% in polytechnics. It was also reported in 2018 that 70% of female graduates from Nigerian tertiary institutions have been sexually harassed in school, with the main perpetrators being classmates and instructors. At institutions like the Lagos State University (LASU) and Obafemi Awolowo University (OAU) two lecturers were alleged to have demanded sex in exchange for marks; while in Ambrose Ali University, two male professors reportedly demanded sex from female students in exchange for marks and were sacked.

Apart from tertiary institutions, incidents of sexual harassment have been recorded at the secondary school level. In Ondo State, a secondary-school teacher was arrested for assaulting a 14-year-old student after school hours and threatening academic repercussions if she resisted (Vanguard News, 2021). In the same vein, a private-school teacher was convicted and sentenced to over 100 years in prison after being found guilty of sexually violating multiple pupils in Kano State (BBC News, 2020).

Schweizer (1998) cited the case of a teacher who resigned from a school due to a complaint from a student concerning sexual advances. He, however, secured another job and continued to behave the same way at different schools for over 15 years. He was finally jailed for sexually assaulting one of his special education students and was sentenced to 20 years.

iii. Aiding examination malpractices

Scholars such as Adebayo (2015) and Nwadiani (2018) have observed that examination malpractice is one of the ways through which teacher professionalism has been faulted in Nigeria. Documented reports have indicated various ways through which some teachers and invigilators assist candidates during examinations, leak questions, or alter results. While students initiate many forms of cheating, **the complicity of some educators and examination officials significantly undermines the credibility of examinations.** In several secondary schools, invigilators have been exposed for collecting money from students to allow them cheat during examinations. Some schools have also been tagged special centres where various forms of examination malpractices are facilitated. In tertiary institutions, some lecturers have been sanctioned for **altering scores or demanding payment to pass students.** National examination bodies such as the West African Examinations Council and Joint Admissions and Matriculation Board have repeatedly sanctioned teachers for aiding cheating during public examinations.

In the 2025 **NECO SSCE**, it was recorded that about nine supervisors were recommended for **blacklisting** for aiding and abetting cheating, including poor supervision and other misconduct. In the same vein, in **Bayelsa State,** both **20 secondary schools and 23 teachers** were accused of involvement in examination malpractice during WAEC and NECO exams. In comparison, 40 schools were reported to have been involved in mass cheating, and **21 supervisors** were recommended for blacklisting due to aiding malpractice and negligence in the **2024 NECO SSCE**. It is so pathetic that some of them have sold their birthright for a token of five hundred naira per student or a little bit more for them to look away. The implication of this on national unity is enormous, as it tempts our education system to produce half-baked graduates who cannot perform effectively in their chosen fields due to a lack of adequate knowledge. It also has negative implications on serious students who legitimately have their results as they feel cheated and so doubt their faithfulness, loyalty and honesty in the face of those who dubiously got high grades and are given undue recognition in society. This violates the professional principles of **honesty, fairness, and competence,** producing graduates without merit and eroding public confidence in certificates issued in Nigeria. In one of his presentations, a former Minister of Education in Nigeria, Mallam Adamu Adamu quoted an inscription at the entrance of a South African University, stressing the havoc of examination malpractice in the life of a nation thus:

Destroying any nation does not require the use of atomic bombs or the use of long-range missiles. It only requires lowering the quality of education and allowing cheating in the examination by students. Patients die in the hands of such doctors. Buildings collapse at the hands of such engineers. Money is lost at the hands of such economists and accountants. Humanity dies at the hands of such religious scholars. Justice is lost at the hands of such judges. The collapse of education is the collapse of the nation (Adamu, 2017).

The plight of teachers

As transmitters of knowledge, values, and social norms in the educational process, teachers are no doubt central. As builders and role models who uphold the civilization of the nation, they deserve due respect in the society and under no circumstance should the students despise them. Unfortunately, however, teachers have been exposed to various forms of student-induced violence. This development raises serious concerns about the sustainability of effective teaching and learning in hostile educational environments. Indeed, educational institutions are increasingly becoming like battlefields and a dangerous working environment for teachers who are being exposed to grievous physical violence. According to Mcobothi (2025), many teachers have been harmed, kicked, pushed, slapped, punched, stabbed, and even shot. It is reported that 176 shootings, which claimed 302 lives, occurred between 1995 and 2019 in the USA (Levine and McKnight, 2021). In a recently concluded research on teachers' experiences of violence from learners in three high schools in the KwaZulu-Natal Pinetown district, Mcobothi (2025), revealed numerous types of violence teachers faced regularly in their teaching profession. Apart from physical violence mentioned above, there is verbal violence like the use of vulgar language, touting, teasing, bullying comments, back-chatting, and verbal threats against the teachers. He cited the experience of female teachers who had experienced sexual violence and were being objectified by learners. This involved sexualising comments posed to young female teachers and objectifying or belittling female teachers by learners. Some of them experienced destruction of property in the form of graffiti on the walls, writing of vulgar comments on the subject textbook against a particular teacher, and theft of their personal belongings.

Mnini (2023) has a list of instances where students in South African provinces violated teachers' human rights. Such an incident occurred in September 2018, when a learner in one of the secondary schools in Dinokana village stabbed a 24-year-old educator to death. In the same province in Zeerust, two learners were said to have attacked five educators in one of the secondary schools in Ntsweletsoku village. Also, in one of the secondary schools in Eldorado Park in Gauteng Province, a learner was reported to have threatened to shoot an educator on the 12th of September 2018; while in the same area, a learner allegedly choked his educator with a computer cord, then beat and raped her, after she pulled her aside to discuss his grades. In Gauteng

Province, a pupil was said to have thrown bricks at an educator in 2018, while a mother was accused of beating her child's educator with an umbrella at Tlhaganyane village near Sun City in the North West province in Rustenburg, on 25 February 2019.

As if the above was not enough, Mnini (2023) further cited instances of brutalisation of teachers at the hands of their students as they affected other countries. Such included the case of a 14-year-old girl, who forced a high school educator to move outside his classroom, wielding an eight-inch kitchen knife. There was also a case in Las Vegas in April 2022, where the county police reported a spate of violent incidents against staff members, including one incident in which a 15-year-old girl threatened an educator with a pair of scissors.

In Nigeria, the case is not different, as teachers have not been accorded much respect in the country. There have been instances where parents assault teachers for reprimanding or punishing their children. Several teachers have been attacked by thugs allegedly hired by parents or students after corporal or disciplinary action. In one of the secondary schools in Ado-Odo Local Government Area of Ogun State, a mother was said to have hired thugs to brutalise a teacher who took disciplinary action against her son (Akinlotan, 2022). Many lecturers have suffered at the hands of students who belong to secret cults. There was a case at the University of Ibadan in 2001 when the competing political groups among students resorted to violence using guns, charms, knives, and other dangerous weapons in their quest for political supremacy. The Vice-Chancellor of the University narrowly escaped being kidnapped and assassinated, as an unknown student drove away his official car and the whole university was held hostage for several days by the armed student groups. In 2021, a lecturer at the University of Ilorin was also assaulted by a student, leaving the lecturer seriously hurt, while a teacher in Abraka, Delta State, was allegedly beaten to death by a student. Teachers are also not spared in the security challenges facing the country. For instance, not less than twelve teachers from St. Mary's Catholic Boarding School in Niger State were said to have been abducted by gunmen in November 2025. At another school in Kebbi State, **gunmen killed a vice-principal and abducted 25 schoolgirls**, with a teacher also injured during the attack.

The effects of brutality in the hands of students who are expected to pay due respect to their teachers are enormous. Apart from the fact that it makes the profession less attractive, it breeds scepticism, depression, emotional trauma and mental fatigue on the part of those who take to the profession. Fear, anxiety, and insecurity become the order of the day, as teachers become constantly fearful of students, especially in classrooms with poor discipline. Being attacked by students undermines a teacher's sense of dignity and professional identity and so enhances loss of self-worth and confidence. When students overpower teachers, the ethical structure of schooling collapses and the erosion of moral authority sets in. It also breeds moral frustration

where teachers would have to struggle with teaching values such as respect and discipline while being victims of abuse. It also weakens educational outcomes as fearful teachers cannot produce confident learners, while if not nip on the bud, it may lead to the normalization of student violence against their teachers as future generations may see aggression against authority as acceptable.

Apart from the above, it seems teachers have not been properly motivated and that may be a reason why they have not put in their best in the classroom to improve student performance. It is disheartening to see those who are expected to take teaching as a full profession trying to search for other means of sustenance because their take-home pay cannot ordinarily take them home. According to Bell (2012), teachers' salaries in Nigeria are arbitrarily lower than the salaries of other workers in the same cadre and with the same qualifications in other sectors, which is why teachers are quitting the profession, as a job that offers a higher salary would attract more and better-qualified personnel than one that offers lower pay. While teachers do not have access to a jumbo salary and other fringe benefits, the little they receive does not come on time. The table below shows what an average teacher receives as salary in a country where a bag of rice costs up to sixty thousand naira and inflation is skyrocketing every day.

Table 1: Primary School Teachers' Salary in Nigeria 2025

Rank / Qualification	**Monthly Salary (₦)**	**Annual Salary (₦)**
Entry Level (NCE Holder)	₦45,000 – ₦55,000	₦540,000 – ₦660,000
Graduate Teacher (B.Ed / B.Sc. Ed)	₦60,000 – ₦80,000	₦720,000 – ₦960,000
Senior Teacher	₦85,000 – ₦100,000	₦1,020,000 – ₦1,200,000
Head Teacher	₦120,000 – ₦150,000	₦1,440,000 – ₦1,800,000

Table 2 Secondary School Teachers' Salary in Nigeria 2025

Rank / Position	**Monthly Salary (₦)**	**Annual Salary (₦)**
Entry Level Graduate Teacher	₦70,000 – ₦90,000	₦840,000 – ₦1,080,000
Senior Secondary Teacher	₦95,000 – ₦120,000	₦1,140,000 – ₦1,440,000

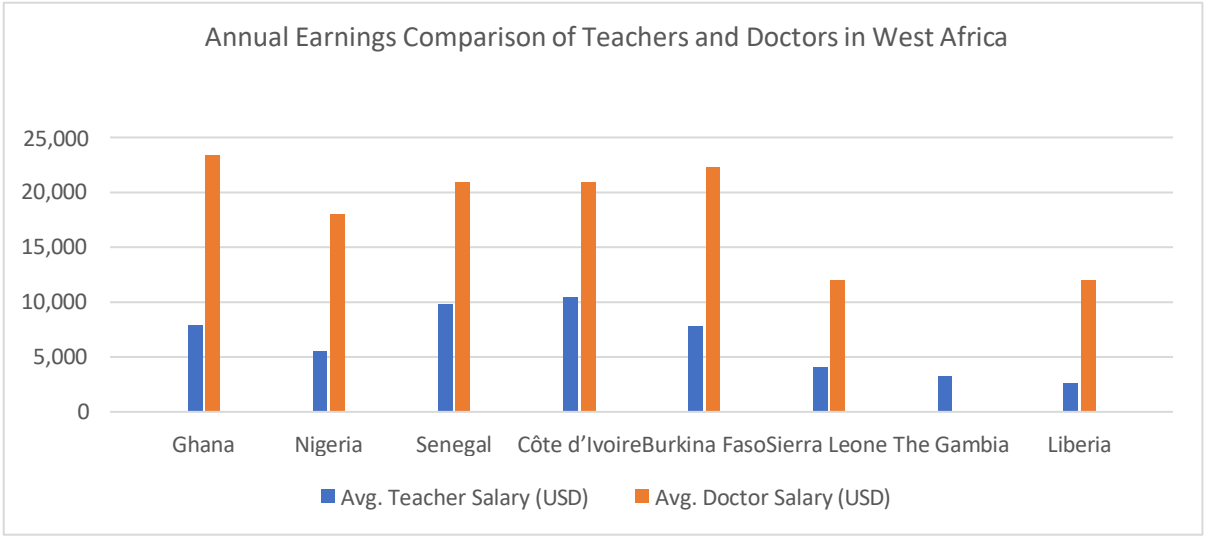
Vice Principal	₦150,000 – ₦180,000	₦1,800,000 – ₦2,160,000
Principal	₦200,000 – ₦250,000	₦2,400,000 – ₦3,000,000

Source: https:/portalguidenigeria.com.ng/Nigeria-teacher-salary-structure/ accessed on 30/12/2025

It is observed that teachers' salaries are not uniform across states; teachers in poorer states earn less, even with the same qualifications and status, while some states still owe their teachers for months. Despite the unattractiveness of the teachers' salaries, many remain on the same salary level for years because promotions are delayed. Where promotions are not delayed, increments commensurate with the promotions are not enjoyed by them. This explains why an average Nigerian would opt for *okada* riding rather than becoming a teacher. The Table below shows the annual earnings of teachers when compared to those of medical doctors in West Africa.

Table 3: Comparative Annual Earnings of Teachers and Medical Doctors in West Africa (USD)

Country	**Avg. Teacher Salary (USD)**	**Avg. Doctor Salary (USD)**	**Doctor–Teacher Pay Ratio**
Ghana	7,900	23,400	**1 : 3.0**
Nigeria	5,500	18,000	**1 : 3.3**
Senegal	9,800	20,900	**1 : 2.1**
Côte d'Ivoire	10,450	20,900	**1 : 2.0**
Burkina Faso	7,800	22,300	**1 : 2.9**
Sierra Leone	4,000	12,000	**1 : 3.0**
The Gambia	3,200	13,000 (est.)	**1 : 4.1**
Liberia	2,600	12,000	**1 : 4.6**



The Table and the chart above show the earnings of teachers and medical doctors across West Africa. They indicate that **medical doctors earn between 2 and 5 times more than teachers,** indicating a structurally entrenched professional pay gap. In addition, they indicate that in no West African country does the average teacher earn **even 60%** of a doctor's salary. In several countries, teacher earnings are **below one-quarter** of doctor earnings. Such disparities exceed normative professional differentials and suggest a systemic undervaluation of teaching. Given that teachers constitute the foundational producers of human capital, this imbalance poses a significant threat to educational quality, professional motivation, and the achievement of the United Nations Sustainable Development Goals, particularly Goal 4 on quality education. Obanya (1999), therefore, sees low wages of teachers when compared with other professionals, low status in the society, inadequate fringe benefits and irregular payments of teachers' salaries as the genesis of teacher motivational crisis in Nigeria and a reason why only those who could not find other more lucrative public or private sector employment go for teaching or just as a stepping stone to an alternative better job.

Teachers in Islamic Thought

Sequel to the creation of man, the next assignment by Allah is teaching. Allah taught Adam the nature of all things before presenting them to the Angels. The Qur'an further emphasizes the importance of education by instructing the Prophet to "read" (Qur'an 96:1–5). Apart from the fact that the first five verses that were revealed to the Prophet are full of education-related matters, Adebayo and Quadri (2016) made a particular reference to the Qur'an 18:60-82, which contains the travail of Prophet Musa (Moses) and his experience in searching for more knowledge and encapsulates healthy student-teacher relationships. According to them, the episode was a demonstration of Moses' encounter with a mysterious man called Khidr, who

introduced him to an entirely new knowledge he had never come across before, despite being a prophet in direct communication with God.

Prophet Muhammad also embodied the ideal teacher. In a hadith narrated by Abu Musa, the Prophet likened a person who comprehends Allah's religion and gets benefit from the knowledge which Allah has revealed through him, learns and then teaches others, to an abundant rain falling on either a fertile land that absorbed it and brought forth vegetation and grass in abundance, or on a hard land that held the rainwater and Allah benefited the people with it and they utilized it for drinking, making their animals drink from it and for irrigation of the land for cultivation (Sahih al-Bukhārī).

Teachers in Islamic settings are called by different names depending on the level at which they operate. At the elementary level of education, the teacher is called *Mu'addib* (teacher of manners). Other Arabic names for teachers include *mudarris*, *Mu'allim, shaykh, ustadh* and *Imam*. In the Moorish society, learned men are eulogistically given the title *a'yan* (notables) (El-Hamel, 1999), while in Yorubaland, they are called *Alfa*, a name believed to have been etymologically coined from the Arabic word for a 'thousand' (Alf) to denote a single person representing one thousand people in terms of knowledge. Another view is that it was from the first Arabic alphabet, *alif*, to denote someone in the forefront when it comes to knowledge (Adebayo, 2013).

The level as well as the environment in which the individual teacher operates determines the respect and honour he receives from the community. The knowledge endowed or acquired by a teacher equally suggests where to operate. As such, a teacher may perform multi-purpose roles in society. He plays educational, political, judicial, spiritual and religious roles. Before this, he must have faced a series of examinations to establish his erudition. An example was that of Imam al-Bukhari, who was said to have passed the rigorous test of a panel of ten scholars of Baghdad (Ahmed, 1987). With the privilege and honour accorded to a teacher in the Muslim community, he makes sure that he acquires proper mastery of the subject he specializes in to avoid unnecessary embarrassment from brilliant students. Though teachers operating at a higher level depended mostly on their notebooks for dictation to their students, most of them knew the content of their books or notes by heart in case they might forget to bring them to the lecture hall.

It needs to be mentioned that meekness and humility are parts of the qualities of a good teacher in the Muslim community. This encourages a cordial relationship between the tutor and the students. It is on record that well-to-do teachers used to render financial assistance to their deserving students. According to Ahmed (1987), Abu Hamid al-Isfara'ini (d. 406/1014-1015 C.E.) used to disburse 160 dinars monthly among students, while Abu Hanifah was said to have sponsored one of his closest disciples, Abu Yusuf, whose father was too poor to finance his education.

At the initial stage of Islam, teachers were not granted any remuneration. Some traditions of the Prophet forbade teachers from accepting any remuneration in anticipation of a greater reward in the hereafter. For example, the Prophet is reported to have said "… Do not seek a prompt reward for it (teaching and reading the Qur'an) (in this life) because it has got a magnificent reward in the hereafter". The Prophet's objection to receiving reward either in kind or cash for teaching could have been because teaching was not professionalized by then, and nearly every teacher had one occupation or profession, while teaching was a secondary and general duty of every knowledgeable person. With the involvement of the government in education and the recruitment of teachers to teach in schools, teaching became a profession and a source of income to those who chose it. The choice of teaching as a profession is enormous, as it implies full commitment, dedication and concentration. Apart from taking it as a full-time job, he takes it beyond the school system, as he has to do a lot of school jobs at home. He indeed has little leisure. At home, he prepares his lessons, assembles his apparatus, and marks the children's work. He also plans how to engage his students on field trips to important places relevant to the courses and attends to other extracurricular activities in the school.

Teacher Professionalism through the Lens of Islam

The development of early Islamic civilization was significantly shaped by scholarship, learning circles, madrasahs, and the close teacher–student relationships that characterized classical Islamic education. Teachers (*muʿallimūn*) were not merely transmitters of knowledge but mentors, moral guides, and community leaders. The Islamic paradigm, therefore, offers a comprehensive basis for understanding modern concepts of mentorship and teacher professionalism (Al-Attas, 1991; Halstead, 2004).

Teacher professionalism refers to the attitudes, behaviours, competencies, and ethical standards expected of educators. In Islamic thought, professionalism integrates moral uprightness (*akhlaq*), sincerity (*ikhlās*), accountability (*amanah*), and continuous learning. It is both a technical and spiritual responsibility. Teacher professionalism in Islamic education transcends mere technical competence and institutional obligation; it is deeply rooted in spiritual consciousness and moral responsibility. In Islamic thought, mentorship (*tarbiyah* and *taʿlīm*) is a holistic process aimed at nurturing the intellectual, moral, spiritual, and social dimensions of the learner. The teacher (*muʿallim* or *murabbī*) is therefore not only a transmitter of knowledge but also a moral exemplar whose conduct significantly shapes the character and worldview of students.

Husain and Ashraf (1979) see a teacher as a model who should be emulated by his students. He is to see his students as impressionable human beings whose characters were to be moulded and who were to be initiated into the moral code which society cherished. Indeed, what a teacher does makes so much more noise than what he says.

He should therefore not treat his students like sheep or cattle which needed to be herded or disciplined. To do this, they proposed that a teacher should be a man of learning, virtue, and a pious man whose conduct by itself could have an impact upon the minds of the young. According to them, his actions, conduct, deportment in class and outside must conform to an ideal which his pupils could unhesitatingly accept.

One of the most influential theologians and educationists in the Islamic tradition who had developed a comprehensive theory of teaching, learning, and moral training was Abū Ḥāmid al-Ghazālī (1058–1111). His views are essential for understanding Islamic perspectives on mentorship (*tarbiyah*) and teacher professionalism. According to him, **teaching is a spiritual and moral responsibility and a continuation of the role of the prophets.** Al-Ghazālī saw teaching not simply as a profession but as an **act of worship** and a **mission of moral transformation**. He argued that the teacher is a guide of hearts, not only a transmitter of information and that education should not solely be tailored towards academic attainment and titles, but should also focus on spiritual purification (*tazkiyah*) and character development (*akhlaq*). He submitted that *"The work of teaching is among the greatest acts of worship when done with sincerity and the intention of drawing people closer to God"* (Al-Ghazālī, *Iḥyāʾ*, Book 3), and so, mentorship is sacred and must be grounded in high moral integrity. As such, the role model function of the teacher is more than classroom instruction, as he is expected to be a character moulder, so that his students learn more from his **character** than from his words. He therefore stressed that a teacher must *practice what he teaches, and anything less than that is tantamount to hypocrisy, which destroys the credibility of the mentor. In other words, Al-Ghazali emphasised that a* teacher's professionalism begins with self-discipline, humility, and sincerity, while mentorship requires living the virtues one hopes to instill. He therefore did not mince words when he advised in his *Ayyuha al-Walad*, *"My dear son, knowledge without action is insanity, and action without knowledge is vanity."*

Al-Ghazālī further emphasized **gentleness, compassion**, and **empathy** in the teacher–student relationship. He opposed harshness and humiliation and so advised the teacher to treat his student like a compassionate father treats his child, so as to make the teaching relationship **mentorship-oriented** rather than authoritarian. He outlined several principles of mentorship to include teaching according to the learner's level of understanding, avoiding embarrassing students, correcting mistakes gently, encouraging students to reflect, not merely memorize and training the soul before filling the intellect.

Principles of Mentorship in Islamic Education

The Qur'an is the foundation of mentorship and teacher professionalism in Islam. The Qur'an presents prophets as mentors and educators guiding their communities with wisdom and compassion. Luqman's advice to his son (Qur'an 31:12–19) exemplifies holistic mentorship involving moral, spiritual, and practical instruction.

The Qur'anic emphasis on knowledge (Qur'an 58:11) underscores the value placed on teachers as custodians of learning.

The Prophet's mentorship was characterized by empathy, gradualism, and individualized instruction. His interactions with young companions such as Ibn ʿAbbās and Anas ibn Mālik demonstrated respect, encouragement, and moral nurturing (Al-Bukhārī, 1997).

In Islam, mentorship is generally viewed as a supportive, developmental relationship in which an experienced individual guides another. The concept aligns with *tarbiyah* (holistic nurturing), *taʿlīm* (instruction), and *ta'dīb* (moral training). Classical scholars emphasized mentorship as a relational and ethical process rooted in compassion, wisdom, and guidance (Al-Ghazālī, 2015). Muslim educational institutions historically integrated mentorship into learning structures. Scholars trained disciples through close companionship. The *Nizāmiyyah* schools institutionalized teacher ethics and instructional excellence (Makdisi, 1981). Female scholars such as ʿĀʾishah bint Abī Bakr mentored generations of learners, demonstrating gender-inclusive educational participation (Nadwi, 2007).

In Islamic pedagogy, the moral character of the teacher constitutes the bedrock of effective mentorship. Knowledge devoid of sound character is considered deficient, as Islam places great emphasis on the ethical embodiment of learning. The Prophet Muhammad, whose educational methodology remains the ultimate model, emphasized moral refinement as the essence of his mission. The Qur'an describes the Prophet as an "excellent exemplar" (Qur'an 33:21). Teachers are expected to model the virtues they teach, demonstrating integrity and moral uprightness. This explains why Az-Zarnuji cited a poem which reads: "An immoral man of learning is a great evil; yet a greater evil is an ignoramus leading a godly life. Both are a great trial everywhere to whoever clings to his religion." Al-Ghazālī insists that teachers must embody the virtues they teach. In *Ayyuha al-Walad*, he warns: "knowledge without action is insanity" (Al-Ghazālī, 1988). Thus, effective mentorship is rooted in the teacher's exemplary conduct, humility, and integrity. A mentor in Islamic education is expected to demonstrate humility, patience, justice, compassion, and respect in dealing with learners. These virtues foster trust, emotional safety, and receptivity among students, thereby enhancing the mentoring relationship.

Another principle relevant to this is the sincerity of intention. Teaching is regarded as an act of worship (*'ibādah*) when undertaken solely for the pleasure of Allah and the benefit of humanity. A sincere mentor seeks neither undue praise nor material gain but prioritizes the intellectual and moral growth of students. This spiritual orientation ensures that mentorship is not exploitative or self-serving but altruistic and transformative. Through *ikhlās*, the teacher models integrity and inspires learners to pursue knowledge with pure intentions. Al-Ghazālī (2015) argues that teaching is a spiritual mission that continues the prophetic function of guiding minds and hearts.

It is an act of worship when performed with sincerity (*ikhlāṣ*), as the teacher's core goal is to refine character and nurture God-consciousness.

Furthermore, in Islamic education, mentorship is a trust (*amanah*) bestowed upon the teacher. Students' minds, values, and future trajectories are entrusted to educators, who are accountable to both society and Allah. This accountability necessitates fairness in assessment, confidentiality in guidance, and responsibility in shaping learners' attitudes. A mentor who betrays this trust, through negligence, abuse of authority, or unethical conduct, undermines the moral fabric of education. Thus, professionalism in Islamic mentorship demands a strong sense of responsibility and self-regulation.

Another core principle of mentorship in Islamic education is the inseparability of knowledge and action. The teacher is expected to practice what is taught, as inconsistency between instruction and behaviour diminishes credibility and moral authority. Classical Muslim scholars consistently warned against teaching without implementation, viewing it as spiritually perilous. Effective mentorship, therefore, involves guiding students through lived examples, where ethical conduct, discipline, and devotion reinforce theoretical instruction.

Islamic mentorship recognizes individual differences in learners' abilities, backgrounds, and temperaments. A professional mentor exercises empathy, wisdom, and flexibility, adopting methods suitable to each learner's capacity. The Prophet Muhammad demonstrated this principle by tailoring his instruction according to context and audience. Such compassionate mentorship fosters confidence, reduces feelings of alienation, and promotes inclusive learning environments.

Professionalism in Islamic mentorship entails a commitment to lifelong learning and self-improvement. Teachers are encouraged to continuously refine their knowledge, pedagogical skills, and spiritual state. This principle reflects the Islamic emphasis on seeking knowledge "from the cradle to the grave." A mentor who remains intellectually and spiritually dynamic is better positioned to guide students in a rapidly changing world while remaining anchored in Islamic values.

Beyond individual development, Islamic mentorship serves broader societal objectives. Teachers act as agents of moral reform and social cohesion by instilling values such as justice, cooperation, and respect for human dignity. Through mentorship, learners are prepared not only for academic success but also for responsible citizenship and ethical leadership.

Islamic Framework for Teacher Professionalism

The first point of becoming a professional teacher is the acquisition of knowledge. Islam prioritizes knowledge and condemns speaking without understanding (Qur'an 17:36). It therefore implies that a teacher must possess both content mastery and pedagogical expertise. A professional teacher should possess strong knowledge of his discipline. He is also expected to understudy his students to deploy the appropriate methodology that suits them. In short, he is expected to know what to teach, who to teach, where to teach, and how to teach. Strong mastery of one's discipline extends beyond possessing certificates or academic qualifications; it involves a deep understanding of subject content, current developments in the field, and the ability to connect theory with practical applications. Possessing this quality will assist him to present concepts with confidence, accuracy, and clarity, anticipate students' difficulties, and respond intelligently to questions. Sound subject knowledge also enables the teacher to simplify complex ideas, use relevant examples, and avoid misinformation that could mislead learners.

Beyond content mastery, a professional teacher is equally expected to understudy his students. Teaching is not a one-size-fits-all exercise; learners differ in age, background, ability, motivation, learning styles, and socio-cultural experiences. Knowing who to teach requires the teacher to understand students' intellectual levels, emotional needs, language competence, and even their fears and aspirations. A teacher who studies his students can identify slow learners, gifted learners, and those with special needs, and can provide appropriate support without discrimination or humiliation. In his *Ihyā' 'Ulumid-dīn,* Al-Ghazalī described a professional teacher as the one who encourages his students to widen the scope of their knowledge, understand his students' levels, and know the scope of the knowledge he should teach them, keep in mind the slow learners among his students and treat them accordingly. The teacher must also be conscious of where to teach. In other words, he should familiarise himself with the physical environment, such as classroom size, facilities, and available instructional materials. He is also expected to study the social, cultural, and institutional context of learning. Teaching in a rural school, an urban elite institution, or a religious-based school presents different challenges and opportunities. A professional teacher adapts his approach to suit the environment, making effective use of available resources while remaining sensitive to cultural norms, institutional policies, and community values.

Most importantly, a professional teacher must know how to teach. This involves selecting and applying appropriate teaching methodologies that align with the subject matter, learners' characteristics, and learning environment. Effective teaching methods may include discussion, demonstration, problem-solving, inquiry-based learning, storytelling, or the use of technology, depending on what best facilitates

understanding. A teacher who understands pedagogy can vary methods to sustain students' interest, encourage participation, promote critical thinking, and assess learning meaningfully. In summary, Islam recognises the fact that knowledge alone is not only the sine qua non for being a professional teacher. The teacher has to be well-trained in the art of teaching, which necessitates awareness and knowledge of child psychology, child behaviour, and techniques of dealing with children. These qualifications would guarantee proper transmission of knowledge and experience from the teacher to the learner.

Professionalism also requires honesty, fairness, patience, and respect for students. In his *Ihyā' 'Ulumid-dīn,* Al-Ghazalī documents the virtues of a teacher, quoting some verses of the Qur'an and ahādith to drive his point home. To him, a professional teacher should, among other things, be sympathetic to his students and treat them like his own children, avoid upbraiding his students in an odious fashion, and keep them from evil ways. Indeed, Islam requires teachers to protect students' dignity, encourage participation, and foster an inclusive environment (Ibn Sahnūn, 1988). Al-Attas (1991) described teaching as *amanah* (trust), requiring sincerity and accountability to God and society; hence, they are expected to maintain high ethical standards, sincerity and accountability.

On the part of the student, he is expected to give due respect to his teachers. Az-Zarnuji likens a teacher to a physician who cannot give his best if he is not respected, and as a sick person who is rude to his healer would bear his ailment patiently, so also a student who is rude to his teacher should be satisfied with his ignorance. Therefore, students are expected to respect their teachers and address them politely with reverence. Shawqī also likens a teacher to a messenger of God who builds and nurtures souls and minds. As marks of respect, he suggests that students should neither walk in front of the teacher nor sit in his spot, not speak in his presence without his permission, not ask him any question when he is tired, and refrain from knocking on his door while waiting patiently for him to come out. To drive home his point, Az-Zarnuji cited the case of Caliph Harūn al-Rashīd, who sent his son to a learned man, al-Asmā'i, to take up the study of grammar and *adab*. One day, the Caliph saw al-Asma'i purifying himself and washing his feet, while the son of the Caliph poured water over his feet. The Caliph frowned at this and he reprimanded al-Asma'i, saying, "I sent my son to you to learn grammar and be instructed in *adab*, so why is it that you don't ask him to pour water with one hand and wash your foot with the other hand?"

Al-Ghazālī lists several ethics of the professional teacher, one of which is sincerity of intention **(Ikhlāṣ). This is to say that teaching should be done solely for the sake of God, and not for fame, prestige, or financial gain. Also, the teacher is expected to be a lifelong learner, as he needs to be abreast of the latest**

developments in his field, hence the need to be committed to continuous improvement. The Qur'anic prayer, *"O my Lord, increase me in knowledge"* (Qur'an 20:114), underscores lifelong learning as part of professionalism. Islamic scholars traditionally engaged in continuous self-improvement. **Also, he should avoid pride and arrogance, and looking down on students or competitors. He should also tailor his instruction to the individual needs of the students. This is because** professionalism requires the ability to diagnose students' spiritual and intellectual needs. He should also avoid **disputes that confuse students and** discourage unnecessary arguments that distract learners from core knowledge.

Suggestions

From the above, it is understood that teachers are the builders of a nation. They nurture the young ones who are generally believed to be the future of tomorrow. They are expected to demonstrate professionalism to mentor their students. They deserve respect from their students and the society at large for them to put in their best in discharging their professional responsibility. To achieve this, the following suggestions are therefore put forward as recommendations:

1. The government should come up with a teacher well-being programme to assist teachers who are faced with the stress of high-stakes examinations, large class numbers, responsibility for others, workload, and behavioural issues with learners. Implementation of Teachers' Salary Scale, training to enhance capacity, social recognition and enhancing better conditions of service for teachers will ultimately engender better performance of teachers.
2. For education to serve as an instrument of national unity and development, there is a need for an effective romantic relationship between faith and education. Education without faith is the easiest means of training clever devils. A faithless education is more or less than a lamp in the hand of a thief to help him pick up the best articles at midnight. In this way, the gap between religious and the so-called secular education should be bridged.
3. The transmitters of knowledge (teachers and lecturers) need to demonstrate a high sense of dignity in the discharge of their responsibility. In addition to their academic qualifications, they must possess the qualities of a good teacher in character, appearance, and general disposition.
4. Individual homes and society, in general, must emphasise good nature, which is indispensable for a desirable 'nurture'. Education cannot make an impression where native capacities are not good; after all, "if you wash a dog in the seven seas, you cannot change his nature, and were you to take the donkey of Jesus to Mecca, upon his return, he would remain a donkey," says Sa'd (cited by Nakosteen, 1964).

5. If education is universal, if it is a process of "mastering the laws of nature and for utilizing them effectively for the welfare of the individual and social reconstruction;" if "it is the art of the utilization of knowledge for complete living," then, there should be no discrimination in seeking it. Therefore, the inclusion of Islamic pedagogical values and principles in the education curriculum of the country should be a priority for students to have a taste of what Islam as a religion has in stock for the development of education generally.

Conclusion

Teachers are custodians of knowledge and civilization. They are indeed the imparters of knowledge who should be accorded much respect in the society. It is what they impart that reflects in society. The wisdom of a nation is preserved and developed in its institutions of learning. Teachers, therefore, need to protect their profession, guard the profession jealously and wake from their slumber to salvage the education industry that is on the verge of collapse. They should rise to wage a strong war against using education as an instrument of exploitation and disintegration. It is neither a war of guns nor a bomb. It is a war of self-integrity, commitment, and dedication to duty. Teachers will surely share in the praise of doctors whose hands healed the patients. They will also share the glory of civil or public servants who perform their duties dutifully. They will be praised for having inspiring leaders because they trained them. In the same vein, where shoddy laws are made by the politicians and lawmakers, they have their share of the blame. They should be ashamed of the unverified information given by journalists because the journalists passed through them. The collapse of education is the collapse of the nation.

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Chapter 16

Competency-Based Teacher Education: Aligning Theory, Practice, and Assessment

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Abstract

Competency-Based Teacher Education (CBTE) represents a paradigm shift in teacher preparation, emphasizing the development of demonstrable competencies, reflective practice, and culturally responsive pedagogy. Unlike traditional teacher education approaches that often prioritize theoretical content over applied skills, CBTE integrates classroom experience, competency-aligned assessment, and continuous professional development to prepare teachers for the diverse and dynamic realities of 21st-century classrooms. This paper provides a comprehensive exploration of CBTE by examining its theoretical foundations, practical applications, including classroom readiness, experiential training, and multilingual instruction, and competency-based assessment strategies. It further reviews international practices in countries, while critically analysing the Nigerian context, highlighting both opportunities and challenges such as resource limitations, faculty capacity gaps, and policy alignment issues. The paper concludes with evidence-based recommendations for strengthening faculty development, standardizing competency frameworks, expanding school partnerships, integrating mother tongue and culturally responsive instruction, leveraging technology, and ensuring coordinated policy support. By aligning theory, practice, and assessment, CBTE offers a sustainable pathway for producing reflective, competent, and adaptable teachers capable of enhancing learner outcomes and promoting inclusive, high-quality education in multilingual contexts.

Keywords: *Competency-Based Teacher Education, Teacher Preparation, Competency-Based Assessment, Culturally Responsive Pedagogy, Global Perspectives*

Introduction

Teacher quality is universally acknowledged as one of the most critical determinants of educational effectiveness, student achievement, and long-term societal development. Extensive empirical research consistently demonstrates that well-prepared, professionally competent teachers significantly influence learners' academic performance, social development, and lifelong learning outcomes (Darling-Hammond, 2017; Hattie, 2009). As education systems across the globe confront rapid social, technological, and economic transformations, the preparation of teachers capable of responding effectively to these changes has become an urgent priority (OECD, 2019).

Traditional models of teacher education have largely emphasized the transmission of theoretical and subject-matter knowledge, often with limited integration of applied pedagogical skills, reflective practice, and authentic assessment of professional competencies (Feiman-Nemser, 2001; Zeichner, 2010). In many contexts, including Nigeria, such models have produced graduates who are knowledgeable in theory but insufficiently prepared for the complex realities of classroom practice (Ogunyemi & Ragpot, 2015). These realities include managing diverse classrooms, addressing multilingual and multicultural learning environments, integrating digital technologies, supporting inclusive education, and responding to learners' cognitive, emotional, and socio-cultural needs (UNESCO, 2017). Consequently, there is growing concern that conventional teacher education approaches no longer adequately prepare teachers for the demands of 21st-century classrooms (Darling-Hammond et al., 2017).

In response to these challenges, Competency-Based Teacher Education (CBTE) has emerged as a transformative framework for rethinking teacher preparation. CBTE shifts the focus of teacher education from time-based and content-driven instruction to the development and demonstration of clearly defined, observable, and measurable professional competencies (Mulder, 2014; Voorhees, 2001). These competencies encompass not only pedagogical and subject-matter knowledge but also professional skills, ethical dispositions, reflective abilities, and adaptive expertise required for effective teaching in dynamic learning environments (Shulman, 1987; Epstein & Hundert, 2002). By emphasizing what teachers are able to do in authentic instructional contexts, CBTE promotes a more practice-oriented, learner-centered, and outcomes-driven approach to teacher preparation (Frank et al., 2010).

Central to CBTE is the deliberate alignment of theory, practice, and assessment. Drawing on foundational conceptions of teacher knowledge and professional practice (Shulman, 1987; Darling-Hammond & Bransford, 2005), CBTE integrates theoretical understanding with sustained practical experiences and rigorous competency-based assessments. This alignment ensures that pre-service teachers can meaningfully translate educational theories into effective classroom practices,

continuously reflect on their professional growth, and demonstrate mastery of essential teaching competencies (Biggs & Tang, 2011). Rather than treating teaching practice as a peripheral component, CBTE positions practice as a core element of learning, supported by structured mentoring, feedback, and reflective inquiry (Korthagen, 2010).

In multilingual and culturally diverse contexts such as Nigeria, the relevance of CBTE is particularly pronounced. Nigeria's complex linguistic landscape, varied socio-cultural realities, and persistent challenges related to educational quality and equity demand teachers who are culturally responsive, inclusive in their pedagogical approaches, and skilled in classroom management (Adebayo, 2018; UNESCO, 2016). CBTE provides a framework for preparing teachers who can effectively address these contextual realities by emphasising competencies related to inclusive education, learner-centered pedagogy, language-sensitive instruction, assessment literacy, and ethical professionalism (Gay, 2018; Tomlinson, 2014). By doing so, CBTE holds significant potential for improving learner engagement, academic outcomes, and overall educational quality (Darling-Hammond et al., 2020).

Despite its growing prominence, the implementation of CBTE is not without challenges. Studies have identified issues related to curriculum redesign, faculty preparedness, assessment reliability, institutional capacity, and policy alignment as major constraints to effective CBTE implementation, particularly in developing contexts (Marope, Griffin, & Gallagher, 2017; Wolf, 2011). A critical and context-sensitive examination of CBTE is therefore necessary to understand its theoretical foundations, practical applications, assessment strategies, and implementation realities.

Against this backdrop, this paper provides a comprehensive exploration of Competency-Based Teacher Education with particular emphasis on the alignment of theory, practice, and assessment. Specifically, the paper aims, first, to examine the theoretical underpinnings and conceptual foundations of CBTE. Second, it seeks to analyze the practical applications of CBTE within teacher preparation programmes. Third, the paper reviews competency-based assessment approaches and examines their implications for teacher quality. Fourth, it discusses global and Nigerian experiences with the adoption of CBTE. Finally, the paper identifies key challenges associated with CBTE implementation and proposes evidence-based strategies for ensuring its effective and sustainable adoption.

By situating CBTE within both global and Nigerian educational contexts, this paper seeks to contribute to ongoing scholarly discourse on teacher education reform and to offer practical insights for policymakers, teacher educators, and institutions committed to strengthening teacher quality and improving educational outcomes.

Practical Applications of Competency-Based Teacher Education

Classroom Readiness and Experiential Training

A defining feature of Competency-Based Teacher Education (CBTE) is its strong emphasis on classroom readiness through sustained and authentic experiential training. Unlike traditional teacher education models that often prioritize theoretical coursework over practice, CBTE deliberately integrates real-world teaching experiences—such as micro-teaching sessions, supervised internships, school-based teaching practice, and extended practicums—into the core of teacher preparation programmes. These experiential components are designed to provide pre-service teachers with structured opportunities to apply theoretical knowledge in authentic instructional contexts under guided supervision.

Through these experiences, pre-service teachers develop the competence to design and implement lesson plans that are aligned with prescribed curriculum objectives and responsive to learners' developmental levels and contextual realities. CBTE also equips teacher trainees with the skills required to employ differentiated instructional strategies that address learner diversity, including differences in ability, language background, learning styles, and socio-cultural experiences. In addition, experiential training enables pre-service teachers to apply effective classroom management strategies, fostering positive learning environments that promote learner engagement, discipline, and inclusive participation.

In line with contemporary educational demands, CBTE further emphasizes the purposeful integration of digital technologies into teaching and learning processes. Pre-service teachers are encouraged to use instructional technologies to enhance lesson delivery, support learner interaction, and improve assessment practices where appropriate (UNESCO, 2016). By engaging in reflective practice during and after these field experiences, teacher trainees develop adaptive expertise, professional confidence, and the practical competence necessary for successful transition into full-time teaching roles.

Competency Frameworks in Teacher Preparation

Central to the effective implementation of CBTE is the use of clearly articulated and structured competency frameworks that define expected learning outcomes in observable and measurable terms. These frameworks typically encompass competencies across the cognitive, affective, and psychomotor domains, ensuring a holistic approach to teacher development (Guskey, 2000). Rather than focusing solely on content mastery, CBTE competency frameworks emphasize the integration of knowledge, skills, attitudes, and professional dispositions required for effective teaching practice.

Within these frameworks, key competencies include the ability to plan instruction based on learners' needs, curricular goals, and contextual demands; implement inclusive and learner-centred teaching strategies that support multilingual learners and students with special educational needs; and apply formative assessment techniques to monitor learner progress and inform instructional decisions. Equally important are competencies related to professional ethics, collaboration, communication, and reflective practice, which underpin responsible and continuous professional growth.

Structured competency frameworks serve as an organising mechanism that ensures coherence and alignment among curriculum content, field-based experiences, and assessment methods within teacher preparation programmes. By explicitly linking coursework to practical teaching tasks and competency-based assessments, CBTE minimises fragmentation in teacher education and promotes consistency between what pre-service teachers are taught, what they practice, and how their performance is evaluated. This alignment enhances programme effectiveness and ensures that graduating teachers possess demonstrable competencies that are directly relevant to classroom practice and educational quality.

Integration with Mother Tongue and Multilingual Instruction

In linguistically diverse contexts such as Nigeria, the integration of mother tongue and multilingual instruction constitutes a critical dimension of effective teaching and learning. Competency-Based Teacher Education (CBTE) provides a robust framework for promoting culturally and linguistically responsive pedagogy by equipping teachers with clearly defined competencies required to navigate multilingual classroom environments. Rather than treating language diversity as a constraint, CBTE positions it as a pedagogical resource that can enhance learning, inclusion, and equity.

Teachers trained under CBTE acquire the competence to use learners' mother tongue or the language of the immediate environment as a medium of instruction, particularly at the foundational stages of education. This practice supports conceptual understanding, facilitates meaningful learner participation, and bridges the gap between home and school experiences. By grounding instruction in familiar linguistic contexts, CBTE-trained teachers are better able to foster comprehension and reduce cognitive barriers to learning, especially for early-grade and marginalised learners (Bamgbose, 2011).

In addition, CBTE emphasises competencies related to scaffolding second-language acquisition, particularly in contexts where English functions as a second or additional language. Teachers are trained to strategically leverage learners' first-language knowledge to support the acquisition of English, using techniques such as translanguaging, code-switching, and contrastive analysis. This approach aligns with

established theories of bilingual education, which emphasise the interdependence of first and second language development and the transfer of cognitive and academic skills across languages (Cummins, 2000).

Furthermore, CBTE prepares teachers to design and adapt instructional materials that reflect learners' cultural identities and linguistic realities. Through culturally relevant texts, examples, and classroom activities, teachers can create inclusive learning environments that affirm learners' identities and promote active engagement. Such culturally and linguistically responsive instructional design not only enhances literacy development but also strengthens learners' motivation, confidence, and sense of belonging in the classroom.

Overall, the alignment of CBTE with mother tongue–based and multilingual instructional practices enhances comprehension, supports literacy acquisition, and improves student engagement in linguistically diverse classrooms. By equipping teachers with practical competencies in language-sensitive pedagogy, CBTE contributes meaningfully to improved educational outcomes and greater equity in multilingual education systems.

Competency-Based Assessment

Principles of Assessment in CBTE

Assessment within Competency-Based Teacher Education (CBTE) is fundamentally oriented toward the demonstration of professional competencies rather than the reproduction of theoretical or rote knowledge. Unlike traditional assessment models that rely heavily on written examinations, CBTE adopts a performance-based approach that evaluates what pre-service teachers are able to do in authentic or simulated teaching contexts. This approach recognizes teaching as a complex professional practice that requires the integration of knowledge, skills, and dispositions (Guskey, 2000; Darling-Hammond, 2017).

To achieve this, CBTE employs multiple and complementary assessment modalities that provide a holistic picture of teacher competence. These include systematic classroom observations using structured checklists and rubrics to assess instructional delivery, classroom management, and learner engagement. Portfolios are also widely used to document professional growth, typically comprising lesson plans, samples of student work, assessment tools, and reflective journals that demonstrate pedagogical decision-making and reflective practice. In addition, simulations and micro-teaching exercises allow pre-service teachers to demonstrate specific competencies in controlled environments before applying them in real classrooms. Peer and mentor evaluations further enrich the assessment process by providing formative feedback from multiple perspectives, thereby enhancing reliability and professional learning.

Alignment with Learning Outcomes

A core principle underpinning competency-based assessment is its deliberate alignment with clearly defined learning outcomes. Assessment tasks are designed to mirror the competencies that pre-service teachers are expected to demonstrate in authentic classroom settings, ensuring coherence between curriculum intentions, instructional activities, and evaluation processes. This alignment strengthens the validity of assessment practices and ensures that teacher performance is judged against professional standards rather than abstract academic criteria.

By aligning assessment with learning outcomes, CBTE promotes reflective practice, as pre-service teachers are encouraged to critically examine their instructional choices, learner responses, and professional growth. The use of formative assessment and continuous feedback helps to identify areas for improvement and supports targeted professional development. Moreover, competency-based assessment reinforces accountability by making expectations explicit and measurable, while simultaneously fostering a culture of continuous learning and professional growth. Through this approach, CBTE contributes to the preparation of teachers who are not only knowledgeable but also demonstrably competent and reflective practitioners capable of meeting the demands of contemporary classrooms.

Global and Nigerian Perspectives on Competency-Based Teacher Education

International Practices in CBTE

Across the globe, numerous education systems have adopted Competency-Based Teacher Education as a strategic approach to improving teacher quality and educational outcomes. Countries such as Finland, Singapore, and Canada are frequently cited as exemplars of effective CBTE implementation due to their strong emphasis on extensive practical teaching experiences, reflective and formative assessment practices, and the alignment of teacher competencies with clearly defined national professional standards. In these contexts, teacher education programmes are characterised by coherent integration of coursework, school-based practice, mentoring, and continuous assessment, ensuring that pre-service teachers develop both theoretical understanding and practical expertise.

Empirical studies indicate that graduates of CBTE-oriented programmes in these countries demonstrate higher levels of classroom readiness, professional adaptability, and instructional effectiveness. They are better equipped to implement learner-centred, inquiry-based, and inclusive pedagogical approaches, respond to diverse learner needs, and engage in reflective professional practice (Darling-Hammond, 2017). International comparative analyses further suggest that the success of CBTE in these contexts is reinforced by strong institutional support, well-prepared teacher educators, and robust quality assurance mechanisms that align teacher preparation with national educational goals (OECD, 2020).

Competency-Based Teacher Education in Nigeria

In the Nigerian context, teacher education has historically been dominated by content-heavy curricula with limited opportunities for sustained and structured field experiences. While teaching practice is a recognized component of teacher preparation programmes, it is often constrained by time limitations, large enrolments, and insufficient supervision, resulting in a disconnect between theoretical knowledge and classroom practice. Against this backdrop, CBTE offers a promising framework for reforming teacher education in Nigeria by prioritizing practice-oriented learning and clearly defined professional competencies.

CBTE provides opportunities for embedding extended, practice-focused internships and school-based experiences within university and college of education curricula, thereby strengthening the practical competence of pre-service teachers. It also supports the alignment of teacher preparation programmes with national teaching standards, such as those articulated by relevant regulatory bodies, ensuring that graduating teachers meet expected professional benchmarks. Furthermore, CBTE creates a structured pathway for integrating multilingual and mother tongue–based instructional competencies into teacher education, which is particularly critical in Nigeria's linguistically diverse context and has been shown to enhance learner comprehension and academic achievement (Ene & Offorma, 2013; Bamgbose, 2011).

Despite its potential, the implementation of CBTE in Nigeria faces significant challenges. These include inadequate infrastructural and instructional resources, large student–teacher ratios that limit effective mentoring and supervision, and limited faculty capacity in designing and implementing competency-based curricula and assessment methods. Additionally, institutional resistance to change and inconsistencies in policy implementation may further constrain the effective adoption of CBTE. Addressing these challenges will require sustained investment, targeted capacity-building for teacher educators, and coherent policy alignment to ensure that CBTE contributes meaningfully to the improvement of teacher quality and educational outcomes in Nigeria.

Challenges and Strategies for Implementing Competency-Based Teacher Education

Challenges in CBTE Implementation

Despite the growing recognition of Competency-Based Teacher Education (CBTE) as a viable framework for improving teacher quality, its effective implementation is often constrained by a range of systemic, institutional, and contextual challenges. One major challenge relates to resource constraints, particularly limited access to adequate teaching and learning materials, digital technologies, and well-structured practicum sites. In many teacher education institutions, insufficient infrastructure

and overcrowded classrooms undermine the quality of experiential learning and restrict opportunities for meaningful practice and assessment.

Another significant challenge concerns faculty capacity. The successful implementation of CBTE requires teacher educators who are themselves competent in competency-based pedagogy, curriculum design, and performance-based assessment. However, many faculty members have been trained within traditional, content-driven paradigms and may lack the requisite expertise or confidence to design competency-aligned learning activities, assessment rubrics, and reflective tasks. This capacity gap can lead to superficial adoption of CBTE principles without substantive pedagogical change.

Policy alignment also presents a critical challenge. Inconsistencies often exist between national teacher education standards, institutional curricula, and the expectations of classroom practice. Such misalignment can result in fragmented implementation, where competency-based intentions at the policy level are not fully translated into curriculum design, teaching practices, or assessment strategies within teacher education programmes.

Furthermore, cultural and linguistic diversity poses an additional layer of complexity, particularly in multilingual contexts such as Nigeria. Preparing teachers to manage linguistically diverse classrooms, integrate mother tongue–based instruction, and employ culturally responsive pedagogies requires deliberate training and contextualised competency frameworks. Without adequate support, pre-service teachers may struggle to address the linguistic and cultural realities of their learners effectively.

Strategies for Effective and Sustainable Implementation

To address these challenges, a multifaceted and systemic approach to CBTE implementation is essential. First, strengthening faculty training and continuous professional development is critical. Teacher educators should be provided with regular opportunities to build capacity in CBTE principles, competency-based curriculum design, performance assessment, and mentoring practices. Such capacity-building initiatives can facilitate a shift from traditional instructional models to more practice-oriented and reflective approaches.

Second, the development of standardized and contextually relevant competency frameworks linked explicitly to national teacher standards is essential for ensuring coherence and consistency. These frameworks should clearly define expected competencies across pedagogical, professional, and ethical domains, serving as a reference point for curriculum development, teaching practice, and assessment.

Third, expanding and strengthening partnerships between teacher education institutions and schools is vital for providing authentic and sustained practicum experiences. Collaborative arrangements can enhance supervision, mentoring, and feedback, thereby ensuring that pre-service teachers are exposed to real classroom challenges and supported in developing practical competencies.

In addition, integrating mother tongue–based and culturally responsive instructional competencies into CBTE programmes is particularly important in multilingual settings. Embedding these competencies within teacher training can enhance teachers' ability to support inclusive learning environments and improve learner engagement and achievement.

Finally, the strategic use of technology can play a significant role in supporting CBTE implementation. Digital tools can facilitate competency-based assessment, performance tracking, reflective practice, and communication between teacher educators, mentors, and pre-service teachers. When effectively deployed, technology can help mitigate resource constraints and enhance the scalability and sustainability of CBTE initiatives.

Recommendations

Based on the analysis of Competency-Based Teacher Education (CBTE) and its relevance to both global and Nigerian contexts, several key recommendations are proposed to enhance the effectiveness, sustainability, and impact of CBTE in teacher preparation programmes.

1. Teacher education institutions should prioritize the continuous professional development of faculty in CBTE principles. This includes equipping teacher educators with the skills necessary to design competency-aligned curricula, implement performance-based assessments, and provide structured mentoring and reflective guidance to pre-service teachers. Strengthening faculty capacity ensures that educators can model and support the competencies expected of graduates.
2. Standardized competency frameworks linked explicitly to national teacher standards should be developed and adopted across all teacher preparation programmes. These frameworks provide clear benchmarks for what pre-service teachers are expected to demonstrate in terms of pedagogical knowledge, instructional skills, professional dispositions, and reflective capacities. They also ensure coherence across curricula, field experiences, and assessment practices, enhancing the quality and comparability of teacher education outcomes.
3. Expand Partnerships with Schools for Practicum Experiences: Teacher education institutions should strengthen and expand collaborations with schools to provide authentic, practice-oriented teaching experiences. Pre-service teachers should have ample opportunities to engage in supervised

classroom teaching, collaborative lesson planning, and reflective practice. Such partnerships enable teacher trainees to apply theoretical knowledge in real-world contexts, receive formative feedback from experienced mentors, and build the professional confidence necessary for effective classroom instruction.

4. Integrate Mother Tongue and Culturally Responsive Instruction: CBTE programmes should embed mother tongue–based and culturally responsive instructional strategies within their curricula. Preparing teachers to address linguistic and cultural diversity in classrooms enhances comprehension, literacy development, and learner engagement, particularly in multilingual contexts such as Nigeria. This approach fosters inclusivity and ensures that teaching is responsive to the sociocultural realities of learners.
5. Leverage Technology to Support Competency-Based Education: Educational technologies should be utilised to facilitate the assessment of teacher competencies, track professional growth, provide opportunities for reflective practice, and enhance communication between teacher educators, mentors, and pre-service teachers. Technology integration can also help mitigate resource constraints and prepare teachers to effectively incorporate digital tools in their own classrooms.
6. Ensure Policy Support and Resource Allocation: Policymakers and educational stakeholders should provide coordinated support, sufficient resources, and ongoing monitoring of CBTE initiatives. Effective implementation requires alignment between national education standards, institutional curricula, and classroom expectations, as well as systematic investment in teaching materials, practicum infrastructure, and faculty capacity. Addressing these systemic factors will institutionalize CBTE as a sustainable approach to teacher education, producing competent, reflective, and adaptable teachers capable of meeting the demands of 21st-century education.

Conclusion

Competency-Based Teacher Education (CBTE) represents a coherent, evidence-informed framework for aligning theory, practice, and assessment within teacher preparation programmes. By emphasizing the development of demonstrable skills, reflective professional practice, and culturally and linguistically responsive pedagogy, CBTE ensures that pre-service teachers are equipped to navigate the complexities and demands of contemporary classrooms. Unlike traditional models of teacher education that often focus predominantly on theoretical knowledge, CBTE integrates practical experiences, structured assessment, and continuous reflection, thereby enabling teachers to translate pedagogical theory into effective instructional

strategies, foster inclusive learning environments, and respond to the diverse cognitive, emotional, and social needs of learners.

In the Nigerian context, CBTE offers a particularly transformative approach to addressing longstanding challenges in teacher preparation. By embedding practice-focused internships, school-based teaching experiences, and competency-aligned assessments within the curriculum, CBTE enhances classroom readiness and professional confidence among pre-service teachers. Furthermore, by integrating multilingual and mother tongue–based instructional strategies, CBTE supports culturally responsive pedagogy and improves comprehension, literacy acquisition, and learner engagement in linguistically diverse classrooms. Its adoption aligns with national priorities to improve teacher quality, promote inclusive education, and ensure that classroom instruction is relevant, equitable, and capable of addressing the socio-cultural realities of learners.

Globally, CBTE has been successfully implemented in countries such as Finland, Singapore, and Canada, where teacher education programmes emphasize reflective practice, extensive school-based experiences, and competency-aligned assessment frameworks. Evidence from these contexts suggests that graduates of CBTE programmes are more adaptable, classroom-ready, and capable of implementing learner-centered and inclusive pedagogies, highlighting the potential of CBTE to enhance professional standards and educational outcomes. These international experiences provide important insights for Nigeria and other developing contexts, demonstrating the value of coherent policy frameworks, institutional support, faculty capacity building, and resource investment in sustaining competency-based approaches.

The successful implementation of CBTE requires sustained and coordinated efforts across multiple levels of the education system. Policymakers, teacher educators, institutions, and stakeholders must work collaboratively to ensure that competency frameworks are clearly defined, curricula are aligned with national standards, practicum opportunities are authentic and well-supervised, and faculty are adequately trained in competency-based pedagogy and assessment. Investments in instructional resources, digital technologies, and mentoring systems are equally essential to support reflective practice and continuous professional growth. When these conditions are met, CBTE has the potential to transform teacher education into a more dynamic, practice-oriented, and learner-centered enterprise, producing teachers who are competent, reflective, adaptable, and capable of positively influencing student learning outcomes, educational quality, and societal development both locally and globally.

In conclusion, the adoption and institutionalization of CBTE represents not merely a reform in teacher education but a paradigm shift in how teachers are prepared, assessed, and supported. By fostering professional competence, reflective practice, and responsiveness to learner diversity, CBTE equips teachers to meet the challenges of 21st-century classrooms, contributes to improved educational outcomes, and advances the broader goals of equity, inclusion, and innovation in education.

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Bosede Abiola Oludare is an active member of professional bodies such the Curriculum Organisation of Nigeria (CON) and the Nigerian Educational Research Association (NERA), which provide her with platforms to collaborate with other scholars in advancing educational research and practice. She continues to play an important role in shaping future educators and strengthening the academic profile of the Department of Curriculum and Instruction at Adeyemi Federal University of Education, Ondo.

> *Institutional reform within a national commission demands collaboration and moral courage. Professor Okwelle fostered partnerships with stakeholders, including provosts, academic boards, and policymakers. His transparent engagement style strengthened mutual respect and reduced adversarial tensions, ensuring that reform was participatory rather than imposed.*

Chapter 17

The Pedagogical Import of Constructivist Scaffolding and Its Implications for Early Childhood Education

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Abstract

There are many theories and philosophies concerning early childhood education, thus, as much pedagogy. One of such pedagogies is the constructivist scaffolding. The crux of this paper is to examine and bring to the fore the pedagogical import of the constructivist scaffolding and its implications in early childhood education using documentary research method. Scaffolding as pedagogy is the assistance given to a child who is struggling to accomplish a task. The assistance may come from the teacher who employs various strategies or from more knowledgeable peers. In all of these, the child is an active constructor of knowledge, mentally acts upon information given, manipulates and transforms it. Thus, the import of the constructivist scaffolding as pedagogy gives the children opportunities to develop critical thinking, logical reasoning and reciprocal teaching that will put aside the rote and memorising way of learning. Moreover, scaffolding imbues in children collaborative and cooperative skills, and acceptable social ethics.

Keywords: *Constructivism, developmentally appropriate practice, early childhood education, pedagogy, scaffolding*

Introduction

The constructivist teacher would argue that there is no teaching without learning. From this pedestal, which ever pedagogy employed must cause learning to take place and the child actively involved in the teaching and learning process. In Rousseau (2019) he stressed the importance of beginning a child's education at birth and education should be based on the nature of the child and the determiner of what knowledge is worth learning. Therefore, not on adult's notions of what children are

like but the notion of child-centred pedagogy. Locke (2011) ideas that, all children are created equally also influenced the theory and practice of childhood pedagogy. Although, his views were that, the mind of a new born was like tabular rasa, a blank slate. In this regard the child acquires knowledge, attitudes and values through experiences. This implies that environment is quite crucial in knowledge construction.

From Dewey (1938) is the view that knowledge is constructed through social relationships, in order words learning was an interactive process that comes about as a result of the simultaneous and mutual interaction of the learner and an enabling environment. These situations had to occur in a social setting, such as a classroom, where learners are involved in manipulating materials and therefore, a community of learners was built and knowledge was formed together within the community. While Vygotsky (1986) held the position that language, thought, and their mediation by society is important for knowledge construction. He averred that the child construct knowledge by gradually internalising external and social activities, including communication, with more competent others. However, social speech is internalised in adulthood and becomes thinking. In the same vein he contended that it still preserves its intrinsic collaborative character.

The role of language and culture in cognitive development and in how we perceive the world are the underpinnings of Vygotsky theories. He further claimed that they provide frameworks through which we experience, communicate, and understand reality. In his theories, he explained the importance of language in learning by demonstrating that in infants, communication is a pre-requisite to the child's acquisition of concepts and language. He opined that people learn with meaning and personal significance in mind, not just through attention to the facts. Furthermore, he posits that the world is not simply in colour and shape but a world with sense and meaning. He further argued that things are not merely round and black with two hands but the conceptual schemes that are transmitted by means of language are essentially social phenomena.

So far it can be deduced that knowledge is socially constructed and learning takes place in particular social and cultural contexts. Social interaction provides children with ways of interpreting the physical and social world, and children thus become acculturated into ways of thinking that are common practice in that specific community. Much learning occurs when children interact with more competent others such as adults and teachers. Through a process of scaffolding, a teacher can gradually guide learners to develop their knowledge and skills while making connections with their existing schemas. Through language, young learners are able to share ideas and seek clarification until they understand and internalised. The emphasis is on a communication-rich environment in which learners are given opportunities to interact with adults and peers in order to negotiate meaning.

An important aspect of Vygotsky (1978) is the zone of proximal development (ZPD). This is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. Understanding of this principle leads to the ability to think of development in terms of developmental potential rather than what has already been achieved developmentally. This makes the interactions among children, adults and peers critically important in teaching and learning. There is an important commonality among constructivists that learning is as an active function of the child as he reconstructs his own understandings in response to experiences. He must access his prior knowledge and beliefs and, through association with his current experience, modify them if needed. In this wise, the learner must make the effort to construct and reconstruct his own knowledge

Constructivism as a Philosophy

Constructivism as a philosophy holds that learners create meaning of the world through a series of individual constructs. In early childhood education, it is a learning process which allows the young learner to experience an environment first-hand, thereby, giving the learner reliable and trust-worthy knowledge. The learner in turn is required to act upon the environment to both acquire and test new knowledge (Momodu, 2021). Simply stated, knowledge is not a thing that can be simply given by the teacher at the front of the room to learners at their desks. Rather, knowledge is constructed by learners through an active, mental process of development. However, Piaget (1985) averred that learning occurs by an active construction of meaning, rather than by passive recipient. A state of disequilibrium occurs when the child encounters a situation that conflicts with his current way of thinking: The child must alter his thinking to restore equilibrium.

Constructivist Pedagogy

Underpinning the constructivist pedagogy is the pre and post Socrates philosophy. Moreover, constructivism is explained with reference to the individual's organizing, structuring and restructuring of experiences, as an on-going life process in accordance with existing schemes of thought. These schemes in turn, become modified and enriched in the course of interaction with the physical and social world thus, encourages *the child to experience the world himself. In so doing the child learns to build on past and present experiences to generate new knowledge.* Importantly, the constructivist teaching imbues in the child the skills of logical reasoning and critical thinking that are crucial to knowing. Notably, critical thinking is seen as a desire to seek knowledge and patience to doubt facts and fondness to mediate. In this context each child discovers and constructs knowledge for self as the result of doing and interacting experientially with his environment. This is in tandem

with Vygotsky's pedagogy, that learning is a socially interactive process as opposed to a solitary pursuit along a predetermined path.

Scaffolding

Scaffolding as pedagogy is the assistance given to a child who is struggling to accomplish a task. The assistance may come by way of modelling or giving specific instructions on how to go about the task. The implication here is that teachers vary their strategies according to the progress the children are making. Momodu (2018). To further explicate the concept of scaffolding in early childhood education is perhaps to picture a construction site. You cannot move on to building the next level of the scaffold without first establishing the level beneath it. Scaffolding is closely related to the socio-cultural theory of Vygotsky (1978) and especially to the zone of proximal development (ZPD). It is pertinent to mention at this point that according to Stone (1998) Vygotsky did not use the word scaffolding but it was Wood *et al*. (1976). The zone of proximal development is constructed through collaborative interaction, mediated by verbal interaction. The child's current or actual understanding is developed in these interactions towards their potential understanding. Basically, experience both socially oriented and object oriented, serves as a primary catalyst of knowledge construction. It provides the activity upon which the mind operates. In addition, knowledge construction is enhanced when the experience is authentic.

Therefore, scaffolding is the support a teacher or more knowledgeable others offer to move the child toward his or her potential understanding.

Furthermore, scaffolding as pedagogy has three basic features known as contingency, fading and transfer of responsibility. Contingency is explained in terms of responsiveness, tailored, adjusted, differentiated, or calibrated support. In this case the teacher's support must be adapted to the current level of the learner's performance and could either be at the same or a slightly higher current level. The teacher is said to act contingently when the support adapts in one way or another to a set or group of learners and employs diagnostic strategies as a tool. The child's current level of competence must first be determined before contingent support is provided. The background knowledge is critical, reason being that, the support to be provided is adapted to the learner's level of learning. Moreover, Olarewaju (2023) emphasised the importance of diagnosis in relation to scaffolding as dynamic assessment. Fading or the gradual withdrawal of the scaffolding must be dependent upon the child's level of development and competence.

Fading is a gradual process where the level or the amount of support is decreased over time. Strongly related to fading is scaffolding, which is the transfer of responsibility via contingent fading. That is, responsibility for the performance of a task is gradually transferred to the child. More often, responsibility is explained in

terms of cognitive or metacognitive activities. For instance if a child, works on a series of tasks and the teacher adapts the support responsively to the understanding of the child, the teacher is teaching contingently. If the child gains understanding, the teacher can fade the support over time. While fading the support, the teacher can also transfer the responsibility to the child so as to take more and more control over his/her learning.

Scaffolding as put forward by the constructivists' affords a holist development of the child. Although Stone (1998) has noted that little attention has been paid to the processes by which scaffolding works. However, the constructivists argue that the child's cognitive load is reduced with the aid of scaffolding and subsequently, allows the child to perform parts of a task that he or she would otherwise not be able to perform. Another scaffolding process, which is sometimes mentioned in the literatures, is internalization of the support provided. In this stance, the child internalizes the support structure associated with the scaffolding such that in the end, teacher scaffolding is no longer needed as the learner can provide his or her own support. However, Stone (1998) argue that the learner does not literally internalize a support structure or scaffolding interchange; rather, appropriates the essence of a support structure or scaffolding interchange but Momodu (2018) referred to it as interiorisation.

Scaffolding as pedagogy in early childhood education

Early childhood care and education has been defined and explained severally as formal schooling usually provided for children before the primary education. What cuts across all definitions is the teaching of young children in formal settings outside the home and by people outside the family. This level of education and care programs address the needs and development of young children. Which includes cognitive, socio-cultural, hygiene factors and emotional abilities till about the age of 8years of age, depending on the geographical location. The implication here is that children are being developed, who are not only confident but intellectually curious, healthy, socially competent and equipped with a solid foundation for lifelong learning.

In the early years learning classroom, there are many strategies employed by the teacher to assists the child from where he is to where he ought to be. However, the constructivists' are quick to point out that no one single strategy has proven to be superior than the other instead educators use a combination of strategies to suit each child at a developmentally appropriate level. Among the many methods employed is scaffolding. Scaffolding is articulated as the role of teachers and more knowledgeable others in supporting the child's development and providing support structures so as to get to the next stage or level of learning. However, an important aspect of scaffolding pedagogy is that they are temporary. Thus, as the learner's ability increases the scaffolding provided by the more knowledgeable other is progressively

withdrawn. Finally the learner is able to complete the task or master the concepts independently.

The import of scaffolding as pedagogy

The essence of scaffolding as pedagogy is for the child to become an independent and self-regulating learner and problem solver. For instance, if a child is on the right track to completing the task, then more encouragement is required. If on the other hand the child starts to struggle, then more specific instructions or demonstration would be needed to aid the child towards the goal. When the child is on the right track, then scaffolding is via encouragement. In all of these scaffolding importantly, is geared towards the needs of each child so as to achieve success in an activity that ordinarily would not have been possible to perform singly. Subsequently, taking the child from where he is to where he ought to be. Therefore, it behoves on the teacher to provide the initial support that is developmentally appropriate for the child to move on to the next level. This is where prior knowledge comes in useful. Moreover, scaffolding as pedagogy may also come from peers who are more knowledgeable. The implication here is that, it is not only the teacher that provides assistance in solving a task.

Importantly too, children learn about learning not only from themselves, but also from their peers. When children review and reflect on their learning processes together, they pick up strategies and methods from one another that help scaffolding. Using scaffolding teachers' and more knowledgeable others can aid and support the children in their own discovery and initiative through what is known as zone of proximal development (ZPD). The zone of proximal development (ZPD) has been defined as the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration and interaction with peers as an effective way of developing skills and strategies (Momodu 2019). The suggestion here is that teachers use cooperative learning exercises where less competent children develop with help from more skilful peers, within the zone of proximal development. In this wise, the zone of proximal development allows a child to tackle a problem just beyond the child's abilities while the more knowledgeable other guide and support the child to come to a solution himself with help.

Implications for early childhood education

From the foregoing, constructivists philosophy argued that the individual generates his own 'rules' and 'mental models,' which is used to make sense of human experiences. In this context learning is simply the process of adjusting our mental mode. In effect the content laid emphasis on interaction between the child and learning tasks. Subsequently, interactions with more knowledgeable others, at this stage, children can perform tasks that they were otherwise incapable of completing

on their own. This is where scaffolding becomes more important. This is a situation where the more knowledgeable continually adjusts the level of his help in response to the child's level of performance. Importantly, scaffolding not only produces immediate results, but also imbibed the skills necessary for independent problem solving in the future. The Constructivists' find this an effective way of using active learning and fostering new understanding in the learners.

So, by applying scaffolding in the classroom, one can make children more responsible in their learning activities and can expect good learning outcome. When we incorporate scaffolding in early childhood classroom, we become more of a mentor and facilitator of knowledge rather than the dominant content expert as a teacher. This pedagogy provides the incentive for children to take more active role in their own learning by sharing the responsibilities and become able to take ownership of the learning as well.

Conclusion

So far an attempt has been made to explore and bring to the fore the import of constructivists' scaffolding as pedagogy and its implications for early childhood education. There is interactions with more knowledgeable others, at which stage, children can perform tasks that they were otherwise incapable of completing on their own and this is where scaffolding becomes more important. The following are basic components of scaffolding, contingency, fading, transfer of responsibility and understanding. Essentially, scaffolding not only produces immediate results, but also imbued the skills necessary for independent problem solving in the future. For the constructivists; scaffolding is an effective way of stirring active learning. Importantly too, children learn about learning not only from themselves, but also from their peers. When children review and reflect on their learning processes together. They pick up strategies and methods from one another that help scaffolding. Using scaffolding teachers' aid and support the children in their own discovery and initiative through zone of proximal development (ZPD).

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Chapter 18

Technical Vocational Education and Training and Contemporary Issues in Nigeria Educational System

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Abstract

Technical and Vocational Education and Training (TVET) constitutes a vital component of Nigeria's educational system, aimed at equipping learners with practical skills, applied knowledge, and occupational competencies necessary for employability, self-reliance, and national development. Despite its recognized importance in policy frameworks, TVET in Nigeria faces multifaceted challenges, including societal bias, outdated curricula, inadequate funding, limited infrastructure, weak regulatory enforcement, and insufficient instructor capacity. These challenges contribute to persistent skills mismatch, low graduate employability, and underutilization of technical human capital. Contemporary trends, including digitalization, Industry 4.0, and green skills integration, further highlight the urgency of reforming TVET to meet evolving labor market demands. Strategic interventions such as competency-based curricula, industry collaboration, work-based learning, inclusive and gender-responsive policies, digital technology integration, and innovative financing are essential for enhancing the quality, relevance, and sustainability of TVET programmes. Strengthening governance, regulatory oversight, and instructor professional development will also ensure effective implementation of national policies and international standards. This paper examines the contemporary issues affecting TVET in Nigeria, identifies key systemic and policy gaps, and proposes strategies to transform TVET into a dynamic, inclusive, and globally competitive system capable of producing skilled, entrepreneurial, and adaptable

graduates. The findings underscore the centrality of TVET in promoting economic diversification, industrialization, poverty reduction, and sustainable development in Nigeria.

Keywords: *Technical Vocational Education and Training, Educational System, and Skills Development.*

Introduction

Technical and Vocational Education and Training (TVET) refers to that aspect of education which provides individuals with practical skills, applied scientific knowledge, and occupational competencies required for gainful employment and self-reliance. According to UNESCO (2016), TVET encompasses education, training, and skills development relating to a wide range of occupational fields, production processes, services, and livelihoods. Its scope extends across formal, non-formal, and informal learning contexts, covering technical colleges, vocational centres, apprenticeships, and industry-based training programmes. The fundamental objective of TVET is to equip learners with employable skills, foster entrepreneurship, and promote workforce adaptability in response to technological and economic changes. Philosophically, TVET is anchored on pragmatism and functionalism, emphasizing learning by doing, problem-solving, productivity, and innovation as critical drivers of national development, poverty reduction, and social inclusion (Okoye & Okwelle, 2014; UNESCO, 2021).

The evolution of TVET in Nigeria can be traced to the colonial era, where vocational education was initially designed to meet low-level manpower needs of the colonial economy. Post-independence reforms repositioned TVET as a strategic instrument for industrialization and human capital development, leading to the establishment of technical colleges, polytechnics, and regulatory bodies such as the National Board for Technical Education (NBTE). Within Nigeria's education policy framework, TVET is formally recognized in the National Policy on Education as a means of producing skilled manpower, promoting technological advancement, and reducing youth unemployment (Federal Republic of Nigeria [FRN], 2014). Contemporary policy directions further emphasize competency-based training, industry collaboration, and entrepreneurship education to align TVET outcomes with labour market demands and national development goals such as economic diversification and sustainable growth (NBTE, 2020; Federal Ministry of Education [FME], 2020).

The Role of TVET in National Economic Growth and Workforce Development

Technical and Vocational Education and Training (TVET) plays a critical role in promoting employability, self-reliance, and workforce productivity by equipping

learners with job-specific competencies and entrepreneurial skills aligned with labour market needs. Through skills-oriented curricula and hands-on training, TVET enhances graduates' readiness for employment, reduces skills mismatch, and supports transitions from school to work. In Nigeria, TVET is increasingly recognized as a viable pathway for addressing youth unemployment and underemployment by fostering self-employment, small-scale enterprise development, and innovation across technical and service sectors (Okoye & Okwelle, 2014; UNESCO, 2021). By strengthening technical competence and work ethics, TVET contributes to the development of a skilled and adaptable workforce capable of responding to technological change and evolving industry demands.

Beyond individual employability, TVET significantly contributes to national economic growth through its support for industrialization, economic diversification, and poverty reduction. A technically skilled workforce is essential for driving productivity in key sectors such as manufacturing, construction, agriculture, energy, and information technology, which are central to Nigeria's economic diversification agenda (World Bank, 2020). TVET also serves as a tool for poverty reduction by providing marginalized and vulnerable populations with marketable skills that improve income-generating opportunities and social mobility. Strong linkages between TVET institutions and the labour market—through industry partnerships, apprenticeship schemes, and competency-based training—ensure that skills development is demand-driven and economically relevant, thereby enhancing national competitiveness and sustainable development outcomes (Federal Ministry of Education [FME], 2020; International Labour Organization [ILO], 2019).

Societal Perception and Status of TVET in Nigeria

Societal perception significantly influences the status and attractiveness of Technical and Vocational Education and Training (TVET) in Nigeria. Culturally, vocational and technical careers are often viewed as inferior to white-collar professions, leading to a persistent bias that associates TVET with low academic ability and limited social prestige. This perception has reinforced a strong preference for university education, where success is frequently measured by certificate acquisition rather than demonstrable skills and competence. The dominance of certificate orientation within the Nigerian education system has further marginalized TVET pathways, despite their relevance to labour market needs and economic development (Okoye & Okwelle, 2014; Ayonmike, Okwelle, & Okeke, 2015). As a result, many students and parents regard TVET as a last resort rather than a deliberate career choice.

Gender stereotypes also shape participation patterns in TVET programmes, with technical fields traditionally perceived as male-dominated, thereby discouraging female enrolment in areas such as engineering, construction, and industrial trades. These societal attitudes limit inclusiveness and contribute to underutilization of the nation's human capital. The negative perception of TVET has broader implications

for enrolment levels, public and private funding, and policy prioritization, often resulting in inadequate infrastructure, outdated equipment, and insufficient instructional resources. Consequently, the weak societal status of TVET undermines its capacity to produce skilled manpower and meet national development goals, highlighting the need for sustained advocacy, policy reforms, and public sensitization to reposition TVET as a prestigious and viable educational pathway in Nigeria (Federal Ministry of Education [FME], 2020; UNESCO, 2021).

Curriculum Relevance and Skills Mismatch in TVET Institutions

Curriculum relevance remains a critical determinant of the effectiveness of Technical and Vocational Education and Training (TVET) institutions in producing industry-ready graduates. Ideally, TVET curricula should be closely aligned with current industry practices, technological trends, and occupational standards to ensure that graduates possess competencies demanded by the labour market. However, in Nigeria, many TVET programmes continue to operate with limited industry collaboration, resulting in curricula that inadequately reflect workplace realities (Ayonmike, Okwelle, & Okeke, 2015). The dominance of theory-oriented instruction over practical, competency-based training further exacerbates the skills mismatch, as students often graduate with strong conceptual knowledge but insufficient hands-on experience, problem-solving ability, and technical proficiency required by employers (NBTE, 2020).

Outdated curricula and slow review mechanisms also contribute significantly to graduate employability challenges in TVET institutions. Rapid technological advancements in sectors such as manufacturing, construction, ICT, and energy demand frequent curriculum updates, yet institutional and bureaucratic constraints often delay curriculum revision and implementation. Employers consistently express concerns about the readiness of TVET graduates, citing deficiencies in practical skills, workplace ethics, digital literacy, and adaptability (World Bank, 2020). Limited incorporation of employer feedback into curriculum design weakens the responsiveness of TVET systems and undermines confidence in their outputs. Strengthening industry linkages, institutionalizing employer participation in curriculum development, and fully adopting competency-based training frameworks are therefore essential for reducing skills mismatch and enhancing the relevance and credibility of TVET in Nigeria (ILO, 2019; UNESCO, 2021).

Funding and Resource Allocation Challenges in TVET

Adequate funding is fundamental to the effectiveness and sustainability of Technical and Vocational Education and Training (TVET) systems; however, persistent budgetary constraints continue to undermine TVET delivery in Nigeria. Government funding patterns have historically prioritized general and university education over technical and vocational pathways, resulting in insufficient budgetary allocations for

infrastructure development, modern training equipment, instructional materials, and staff capacity building in TVET institutions (Yakubu, 2018). These funding shortfalls limit institutions' ability to adopt emerging technologies, maintain workshops and laboratories, and implement competency-based training models that require substantial capital investment. Consequently, inadequate funding directly affects training quality, learner outcomes, and the relevance of skills acquired by TVET graduates within the labour market.

In response to public funding limitations, donor agencies and international development partners have played an increasingly important role in supporting TVET through targeted intervention programmes. Organizations such as the World Bank, African Development Bank, and GIZ have supported skills development initiatives aimed at improving employability, entrepreneurship, and institutional capacity in Nigeria (African Development Bank [AfDB], 2019). Additionally, public–private partnerships (PPPs) are emerging as viable financing mechanisms for TVET, enabling industry participation in curriculum development, equipment provision, apprenticeship schemes, and co-funding of training facilities. Effective PPP arrangements not only supplement government resources but also enhance training relevance and sustainability by aligning TVET investments with labour market demand and industrial growth priorities (McGrath et al., 2020; Palmer, 2017).

Infrastructure, Facilities, and Equipment Deficit in TVET Institutions

The availability and quality of infrastructure, facilities, and equipment are central to effective Technical and Vocational Education and Training (TVET) delivery, particularly given its practical and skills-oriented nature. In Nigeria, many TVET institutions operate with poorly equipped workshops, inadequate laboratories, and overcrowded training centres that fall short of minimum instructional standards. Studies have shown that obsolete tools and limited access to modern technologies constrain learners' exposure to current industrial practices, thereby reducing the relevance and competitiveness of acquired skills (Famiwole & Akinbode, 2019). The persistence of outdated equipment also hampers instructors' ability to demonstrate contemporary techniques, weakening the overall effectiveness of hands-on training and assessment processes.

Weak maintenance culture and limited sustainability planning further exacerbate infrastructure challenges in TVET institutions. Facilities are often poorly maintained due to insufficient technical support, irregular funding, and lack of institutional maintenance policies, leading to rapid deterioration of existing resources. These infrastructure gaps have direct implications for skill acquisition, as students trained in substandard environments struggle to develop the practical competence, confidence, and safety awareness required in modern workplaces (Ogunlade & Adebayo, 2020). Ultimately, inadequate infrastructure undermines the credibility of TVET programmes, contributes to graduate unemployability, and weakens the

sector's capacity to support national industrialization and workforce development goals, underscoring the need for sustained investment and infrastructure revitalization (UNEVOC, 2018).

Quality Assurance, Accreditation, and Regulatory Issues in TVET

Quality assurance and regulatory oversight are essential for maintaining standards and credibility within Technical and Vocational Education and Training (TVET) institutions in Nigeria. The National Board for Technical Education (NBTE) serves as the primary regulatory body responsible for curriculum development, accreditation of programmes, and quality assurance in polytechnics, monotechnics, and technical colleges. Through established accreditation standards, NBTE evaluates institutional capacity in terms of staffing, curriculum content, facilities, equipment, and governance structures to ensure minimum quality benchmarks are met (NBTE, 2018). Other agencies, such as the National Universities Commission (NUC) and relevant professional bodies, also contribute to regulatory oversight where TVET intersects with higher education and professional certification frameworks.

Despite these regulatory structures, significant challenges persist in monitoring, evaluation, and institutional compliance across TVET institutions. Inconsistent enforcement of accreditation standards, limited funding for quality assurance activities, and capacity constraints within regulatory agencies weaken effective supervision and follow-up mechanisms. These gaps often result in disparities in programme quality, inadequate institutional accountability, and the proliferation of substandard training centres (Bamidele & Odeleye, 2020). Weak quality assurance systems ultimately affect graduate competence and employer confidence in TVET outputs. Strengthening regulatory capacity, improving transparency in accreditation processes, and institutionalizing continuous quality improvement mechanisms are therefore critical to enhancing the effectiveness, accountability, and public trust in Nigeria's TVET system (Kingombe, 2011; UNESCO, 2017).

Human Resource Capacity and Instructor Development in TVET

The effectiveness of Technical and Vocational Education and Training (TVET) largely depends on the quality, competency, and preparedness of its instructors. Qualified and competent instructors are essential for delivering both theoretical knowledge and practical skills to students. In Nigeria, however, many TVET instructors possess limited pedagogical training, industry experience, or exposure to emerging technologies, which undermines the quality of instruction and practical skill acquisition (Okwelle & Okeke, 2019). Industrial attachment and ongoing professional development opportunities are crucial mechanisms for bridging the gap between academic instruction and industry requirements, enabling instructors to remain current with technological innovations, pedagogical strategies, and sectoral best practices.

TVET institutions also face significant challenges in teacher recruitment, retention, and motivation. Low remuneration, heavy workloads, limited career progression, and poor recognition of technical instructors compared with university academics contribute to high attrition rates and reduced staff commitment (Adesina & Adebayo, 2020). Insufficient staffing levels often increase teaching loads, limit individualized student attention, and constrain the implementation of practical training sessions. Enhancing human resource capacity through competitive remuneration, structured professional development programs, industry partnerships, and performance-based incentives is therefore critical to ensuring instructor competence, retention, and overall quality in TVET delivery (McGrath, 2019; UNESCO-UNEVOC, 2018).

Digital Transformation and Technology Integration in TVET

Digital transformation is increasingly shaping the landscape of Technical and Vocational Education and Training (TVET) by enhancing teaching, learning, and skills development. Integration of Information and Communication Technology (ICT) in TVET enables interactive learning, access to up-to-date instructional resources, and exposure to industry-standard software and machinery. E-learning platforms, virtual laboratories, and simulation tools provide students with practical experiences that replicate real-world industrial processes, bridging the gap between classroom instruction and workplace demands (Okon & Effiom, 2021). Despite these advancements, the adoption of digital technologies remains uneven in Nigerian TVET institutions due to limited ICT infrastructure, inadequate instructor training, and inconsistent internet access, which constrains the full potential of technology-enhanced learning.

The growing relevance of Industry 4.0, characterized by automation, robotics, artificial intelligence, and smart manufacturing, further underscores the need for digital competence among TVET students and instructors. A significant digital skills gap persists, limiting graduates' employability and the ability of institutions to meet evolving industrial requirements (Eze & Onwuka, 2020). Preparing TVET institutions for Industry 4.0 necessitates strategic investments in digital infrastructure, continuous professional development for instructors, and curriculum updates that incorporate emerging technologies and digital literacy. By fostering digital readiness, Nigerian TVET can enhance learner employability, support industrial innovation, and position itself as a key driver of economic growth and technological advancement (Adu, Okoro, & Nwosu, 2022; UNESCO, 2020).

Industry Collaboration and Work-Based Learning in TVET

Industry collaboration and work-based learning are pivotal for ensuring that Technical and Vocational Education and Training (TVET) graduates possess the skills demanded by the modern labour market. Apprenticeship and internship models provide students with structured opportunities to gain practical experience, develop

workplace competencies, and understand professional norms, thereby bridging the gap between theoretical instruction and real-world application (Mordi et al., 2018). School–industry partnership frameworks formalize these engagements, enabling institutions to align curricula with industry requirements, access modern equipment, and facilitate instructor exposure to current technologies and best practices. Such partnerships are essential for producing graduates who are employable, entrepreneurial, and adaptable to evolving industrial contexts.

Despite their benefits, sustaining meaningful industry engagement in Nigerian TVET institutions faces multiple challenges, including limited private sector incentives, weak coordination mechanisms, and misalignment between institutional objectives and industrial expectations (Ojo & Odukoya, 2020). Furthermore, small and medium enterprises, which form the bulk of Nigeria's industry base, often lack the capacity to accommodate large numbers of trainees or implement structured work-based learning programmes. Nevertheless, effective collaboration enhances graduate employability, improves institutional relevance, fosters innovation, and strengthens national economic development by supplying skilled manpower tailored to industry needs (Eze & Okafor, 2019; UNESCO-UNEVOC, 2018). Strengthening institutional policies, creating incentive structures for industry participation, and embedding work-based learning systematically within TVET programmes are critical for optimizing these benefits.

Policy Implementation Gaps and Governance Challenges in TVET

Effective policy implementation is crucial for realizing the objectives of Technical and Vocational Education and Training (TVET), yet in Nigeria, a significant disconnect exists between TVET policies and practice. Although policies such as the National Policy on Education and strategic frameworks highlight the importance of skills development, industrial alignment, and employability, implementation is often hampered by weak institutional coordination, bureaucratic bottlenecks, and limited enforcement mechanisms (Akomolafe & Adeniran, 2020). The lack of coherent monitoring and evaluation frameworks further undermines the translation of policy objectives into actionable programmes, resulting in misalignment between national development goals and the operational realities of TVET institutions.

Governance challenges, including role conflicts among regulatory bodies, inconsistent political support, and frequent policy discontinuity, further exacerbate implementation gaps. Institutional decentralization and fragmented management structures can lead to uneven resource distribution, disparities in programme quality, and weak accountability (Yakubu & Alimi, 2019). Political will, stability, and long-term commitment are critical for sustaining reforms, financing, and institutional capacity building. Without robust governance structures, TVET institutions struggle to respond to labour market needs, maintain quality standards, and effectively contribute to national human capital development (Onuka & Ofoegbu, 2021;

UNESCO, 2018). Strengthening coordination among agencies, ensuring policy continuity, and instituting clear governance frameworks are therefore vital for enhancing the effectiveness and sustainability of TVET in Nigeria.

Equity, Access, and Inclusion in TVET Programmes

Equity and access are critical determinants of the effectiveness and social relevance of Technical and Vocational Education and Training (TVET) in Nigeria. Rural and disadvantaged populations often face systemic barriers that limit their participation in TVET, including geographic distance from training centres, inadequate infrastructure, and lack of information about available programmes (Okojie, 2020). Gender disparities remain pronounced, with socio-cultural norms and stereotypes limiting female participation in technical and industrial trades, while persons with disabilities frequently encounter physical, curricular, and attitudinal barriers that constrain their inclusion (Adepoju & Akinwale, 2019). Cost barriers, including tuition fees, materials, and living expenses, further restrict access, particularly for learners from low-income families, creating a cycle of inequality and skill deprivation.

To address these challenges, inclusive TVET strategies emphasize flexible learning pathways, scholarships, community-based training centres, and targeted support for underrepresented groups. Policy initiatives and institutional practices that promote gender equity, disability inclusion, and rural outreach have been shown to improve enrolment, retention, and graduate outcomes (UNESCO, 2021). Public–private partnerships and donor-supported programmes also play a vital role in enhancing access, providing resources, and ensuring that TVET education is affordable and responsive to the needs of marginalized populations (Ogbuanya & Nwachukwu, 2018). Strengthening these inclusive measures is essential for realizing the social and economic potential of TVET, ensuring equitable human capital development, and fostering sustainable national growth.

Entrepreneurship Education and Graduate Self-Employment in TVET

Entrepreneurship education is increasingly recognized as a vital component of Technical and Vocational Education and Training (TVET), equipping graduates with the skills, knowledge, and mindset required to establish and manage small businesses. Integration of entrepreneurship into TVET curricula exposes learners to business planning, financial management, marketing, and innovation, thereby promoting self-reliance and reducing dependence on formal employment (Akinyemi & Olaniyan, 2020). Practical initiatives such as start-up support, incubation centres, mentorship programmes, and business competitions further enhance graduates' entrepreneurial capacities and readiness to engage in income-generating activities.

Despite these efforts, challenges to graduate self-employment in Nigeria remain significant, including limited access to finance, inadequate business networks,

regulatory hurdles, and poor market linkages (Ezeh & Nwokoro, 2019). Nevertheless, TVET provides a strategic pathway to job creation by producing technically competent and entrepreneurial graduates who can fill gaps in the informal and formal sectors, stimulate local enterprise development, and contribute to national economic growth (Okafor & Udeh, 2021). Strengthening entrepreneurship education through policy support, industry collaboration, and continuous mentoring is critical to maximizing TVET's potential for promoting self-employment, reducing unemployment, and fostering sustainable economic development.

Emerging Global Trends and Their Implications for TVET in Nigeria

Technical and Vocational Education and Training (TVET) in Nigeria is increasingly influenced by global trends that shape skills demand, workforce expectations, and sustainable development priorities. The emergence of green skills—competencies in renewable energy, environmental management, and sustainable production—reflects the global emphasis on sustainable development and climate-responsive industries. Integrating these skills into TVET curricula equips graduates to participate in environmentally responsible enterprises and supports Nigeria's transition toward a green economy (Adebisi & Oladipo, 2021). Similarly, globalization has heightened the importance of aligning Nigerian TVET standards with international benchmarks, fostering workforce mobility, and ensuring that graduates can compete effectively in global labour markets (Maro, 2019).

Global workforce mobility and migration further underscore the need for internationally relevant TVET programmes that enhance employability and competitiveness. Exposure to global best practices, adoption of modern training technologies, and benchmarking against successful TVET systems in countries such as Germany, Singapore, and South Korea provide valuable lessons for curriculum design, industry collaboration, and competency-based training (Okoro & Chukwuma, 2020). Adapting these lessons can strengthen Nigeria's TVET system by improving graduate outcomes, fostering innovation, and supporting economic diversification. Consequently, understanding and integrating emerging global trends into TVET policy and practice is essential for producing a skilled, adaptable, and globally competitive workforce capable of driving sustainable national development (UNESCO-UNEVOC, 2020; World Bank, 2021).

Prospects, Reforms, and Strategic Recommendations for Strengthening TVET

1. **Curriculum Reform and Competency-Based Approaches**
    - Update TVET curricula to align with technological advancements, labour market demands, and global best practices.
    - Adopt competency-based training that emphasizes practical skills, problem-solving, and hands-on learning outcomes.

2. **Increased Funding and Innovative Financing Models**

   - Expand government budgetary allocations for infrastructure, equipment, and instructional resources.
   - Encourage public–private partnerships (PPPs), industry investment, anddonor-supported initiatives to supplement funding.

3. **Strengthening Industry Partnerships and Governance**

   - Foster collaboration between TVET institutions and industries for curriculum development, internships, and workplace training.
   - Enhance regulatory frameworks and institutional governance to ensure quality assurance, accountability, and programme relevance.

4. **Integration of Digitalization and Emerging Skills**

   - Incorporate ICT, e-learning, virtual laboratories, and Industry 4.0 skills into training programmes.
   - Develop green skills and entrepreneurship education to support sustainable development and self-employment.

5. **Future Directions for TVET in Nigeria**

   - Position TVET as a key driver of economic diversification, industrialization, and poverty reduction.
   - Focus on accessibility, inclusion, and equity to ensure marginalized populations benefit from TVET opportunities.

Conclusion

Technical and Vocational Education and Training (TVET) represents a critical pillar for Nigeria's human capital development, economic growth, and social inclusion. Despite its long-standing presence in the educational system, TVET continues to face multifaceted challenges, including societal bias, outdated curricula, inadequate funding, infrastructure deficits, regulatory gaps, and limited instructor capacity, all of which constrain its effectiveness and relevance. Simultaneously, emerging global trends, digitalization, and the increasing emphasis on entrepreneurship underscore the need for reforms that enhance competency-based learning, industry collaboration, and alignment with international standards. By addressing policy implementation gaps, promoting equity and inclusion, strengthening work-based learning, and leveraging innovative financing and governance strategies, Nigerian TVET can transform into a dynamic system capable of producing skilled, adaptable, and entrepreneurial graduates. Ultimately, a robust and forward-looking TVET framework is essential not only for improving individual employability and self-

reliance but also for driving sustainable industrialization, economic diversification, and national development.

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Chapter 19

Evaluating The Effectiveness of Comprehensive Health Education Programmes in Promoting Mental Health Awareness Among College Students

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Abstract

The purpose of this study was to evaluate the effectiveness of Comprehensive Health Education Programs (CHEPs) in promoting mental health awareness among Primary Education Studies students at the Federal College of Education (Technical) Akoka, Lagos. The study aimed to assess the level of mental health awareness before and after participation in CHEPs, evaluate the impact of these programs on students' attitudes towards mental health issues, and investigate the relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns. A pretest-posttest quasi-experimental research design was employed, involving a population of 300 second and third-year students in the Primary Education Studies Department. The sample comprised all 278 students who completed the questionnaires. A structured 25-item questionnaire, validated by experts and demonstrating a reliability coefficient of 0.89, was used for data collection. The data were analyzed using descriptive statistics to answer the research questions and t-tests for hypothesis testing. The findings revealed a significant increase in mental health awareness, with mean scores rising from 2.85 to 3.12 after CHEPs. Additionally, participation in CHEPs positively influenced students' attitudes towards mental health, fostering greater empathy and reducing stigma. The study concluded that CHEPs effectively enhance mental health awareness and encourage help-seeking behavior among students. Major recommendations include the integration of CHEPs into the curriculum, the establishment of peer support programs,

and ongoing evaluations of mental health initiatives to ensure continuous improvement and relevance.

Keywords: *Mental Health Awareness, Comprehensive Health Education Programs, Primary Education Studies, Student Attitude*

Background of the Study

Mental health awareness among college students has become an increasingly critical issue in recent years, particularly as the prevalence of mental health disorders continues to rise within this demographic. According to the American College Health Association (2021), approximately 40% of college students reported feeling so depressed that it was difficult to function, highlighting the urgent need for effective mental health education programs (American College Health Association, 2021). In Nigeria, the situation mirrors global trends, with rising concerns about the mental well-being of students in higher education institutions, including those at the Federal College of Education (Technical) Akoka, Lagos.

The Federal College of Education (Technical) Akoka, Lagos, offers a National Certificate in Education (NCE) program that includes Physical and Health Education (PHE) as a core component. This program is designed to equip students with the necessary skills and knowledge to promote health and well-being among their peers and communities. Comprehensive Health Education Programs (CHEPs) are integral to this curriculum, focusing on various aspects of health, including mental health awareness. These programs are compulsory for students throughout their three-year NCE program, ensuring that all graduates possess a foundational understanding of health education principles.

Research indicates that comprehensive health education can significantly enhance students' knowledge and attitudes towards mental health issues. For instance, a study by Chang et al. (2020) found that students who participated in structured health education programs demonstrated improved mental health literacy and reduced stigma associated with mental illness. This is particularly relevant for the Primary Education Studies students at FCET Akoka, who are expected to serve as future educators and role models in their communities. By equipping them with mental health awareness, these programs can foster a more supportive environment for students facing mental health challenges.

Moreover, the integration of mental health education into the curriculum aligns with global health initiatives aimed at promoting mental well-being among young adults. The World Health Organization (2021) emphasizes the importance of mental health education in schools as a means to prevent mental health disorders and promote

resilience among students. By evaluating the effectiveness of CHEPs at FCET Akoka, this study aims to contribute to the broader discourse on mental health education in Nigeria and its potential impact on student well-being.

The effectiveness of health education programs can be assessed through various methodologies, including pre- and post-intervention surveys, focus groups, and interviews. These methods allow researchers to gauge changes in students' knowledge, attitudes, and behaviors regarding mental health. A study conducted by O'Connor et al. (2021) utilized a mixed-methods approach to evaluate a mental health awareness program in a university setting, revealing significant improvements in students' understanding of mental health issues and their willingness to seek help.

In addition to enhancing knowledge and attitudes, comprehensive health education programs can also play a crucial role in reducing stigma associated with mental health. Stigma remains a significant barrier to help-seeking behavior among students, often preventing them from accessing necessary support services. Research by Corrigan et al. (2016) highlights that educational interventions can effectively reduce stigma and promote a culture of acceptance and understanding within educational institutions.

The current study will focus specifically on the Primary Education Studies students at FCET Akoka, Lagos, as they represent a unique population that will eventually influence the mental health awareness of future generations. By evaluating the effectiveness of CHEPs in this context, the study aims to provide insights into how these programs can be optimized to better serve students' needs and enhance their capacity to promote mental health awareness in their future careers.

Furthermore, the findings of this research could inform policy decisions regarding the integration of mental health education into teacher training programs across Nigeria. As mental health issues continue to rise among young people, it is imperative that educators are well-equipped to address these challenges. The outcomes of this study may serve as a model for other institutions seeking to implement or improve their health education programs.

In conclusion, the evaluation of comprehensive health education programs in promoting mental health awareness among college students is a timely and necessary endeavor. By focusing on the Primary Education Studies students at FCET Akoka, this study aims to contribute valuable knowledge to the field of health education and support the development of effective strategies for promoting mental well-being among future educators.

Statement of the Problem

Despite the increasing recognition of mental health issues among college students, many educational institutions, including the Federal College of Education (Technical) Akoka, Lagos, struggle to effectively promote mental health awareness through their curricula. This gap poses a risk to students' overall well-being and academic success, necessitating an evaluation of the Comprehensive Health Education Programs (CHEPs) designed for Primary Education Studies students, particularly in how they address mental health awareness.

Purpose of the Study

The purpose of this study is to evaluate the effectiveness of Comprehensive Health Education Programs in promoting mental health awareness among Primary Education Studies students at FCET Akoka, Lagos.

Research Objectives

1. To assess the level of mental health awareness among Primary Education Studies students before and after participating in CHEPs.
2. To evaluate the impact of CHEPs on students' attitudes towards mental health issues.
3. To investigate the relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns.

Research Questions

1. What is the level of mental health awareness among Primary Education Studies students before and after participating in CHEPs?
2. How do CHEPs influence students' attitudes towards mental health issues?
3. Is there a relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns?

Null Hypotheses

H_{01}: There is no significant difference in the level of mental health awareness among Primary Education Studies students before and after participating in CHEPs.

H_{02}: There is no significant relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns.

Research Design

The study employed a pretest-posttest quasi-experimental research design to evaluate the effectiveness of Comprehensive Health Education Programs in promoting mental health awareness among Primary Education Studies students at FCET Akoka, Lagos.

This design allowed researchers to assess participants' levels of mental health awareness before and after the intervention, providing a clear picture of any changes attributable to the educational programs. By utilizing pretest and posttest assessments within the same group, the researchers could effectively measure the impact of the intervention while controlling for individual differences. This approach was deemed appropriate as it facilitated the collection of quantitative data that could demonstrate the program's effectiveness in enhancing mental health awareness, thus informing future educational strategies within the institution.

Population, Sample, and Sampling Technique

The population for this study comprised all second and third-year students enrolled in the Primary Education Studies (PES) Department at the Federal College of Education (Technical) Akoka, Lagos. This group was specifically chosen due to their engagement in Physical and Health Education (PHE) and Comprehensive Health Education Programs, which are compulsory components of the three-year National Certificate in Education (NCE) program. The total population of the 200 and 300 Level students in the PES Department was approximately 300, with about 150 students in each level. Given the manageable size of the population, the study utilized a total sample of all 300 students who participated in the PHE and Comprehensive Health Education lectures till the end of the academic session. No sampling technique was necessary, as the entire population was included in the study, ensuring comprehensive data collection and representation of the target group.

Instrument for Data Collection

The data collection for this study was conducted using a researcher constructed structured questionnaire comprised of 25 items, organized into four distinct sections. The first section gathered bio-data information from the participants, including seven items related to demographics such as age, gender, level of study, and previous exposure to mental health education. This information was essential for understanding the characteristics of the sample population and ensuring a comprehensive analysis of the results.

The subsequent three sections of the questionnaire were designed to address the specific research questions. Each of these sections contained six items, utilizing a four-point Likert scale format to assess participants' responses. The Likert scale options included Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The second section focused on measuring the level of mental health awareness among students before and after their participation in the Comprehensive Health Education Programs (CHEPs). The third section evaluated how CHEPs influenced students' attitudes toward mental health issues. Finally, the fourth section investigated the relationship between participation in CHEPs and students' willingness to seek help for mental health concerns.

Validity and Reliability of the Instrument

A 25-item structured questionnaire was developed and rigorously validated to ensure its content, construct, and face validity. This validation process involved the expertise of three highly experienced lecturers: two specializing in Educational Evaluation and Research and one in Physical and Health Education (PHE). Their feedback was instrumental in refining the questionnaire to accurately capture the intended constructs related to mental health awareness among Primary Education Studies students. To establish the reliability of the instrument, a pilot test was conducted with 20 participants—10 from each of the two levels selected for the study—who were not part of the main sample. The data collected from this pilot test were analyzed using the Cronbach Alpha method, resulting in a reliability coefficient of 0.89. This high coefficient indicated that the instrument was reliable and suitable for use in the main study, ensuring that it would yield consistent and dependable results.

Method of Data Collection and Data Analysis

Following the validation process, the 25-item questionnaire was administered to a total of 300 selected participants, with 150 students from each level of the Primary Education Studies program. The data collection period lasted for two weeks, during which the researchers employed a direct, in-person approach to distribute the questionnaires. This method facilitated better engagement with the participants and ensured higher response rates. Out of the 300 questionnaires administered, a total of 278 properly completed copies were retrieved for analysis. The collected data were analyzed using descriptive statistics, including frequency (f), percentage (%), mean ($\bar{x}$), and standard deviation (SD), to answer the research questions. For hypothesis testing, the first null hypothesis was evaluated using a t-test to assess differences in mental health awareness before and after participation in the Comprehensive Health Education Programs. The second null hypothesis was tested using the Pearson Correlation Coefficient to examine the relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns.

Data and Results Presentation

Research Question 1

What is the level of mental health awareness among Primary Education Studies students before and after participating in CHEPs?

Table 1: Level of Mental Health Awareness Among Students

S/N	Level of Mental Health Awareness Among Students	N	f	%	$\bar{X}$	SD
1	I can identify signs of mental health issues in myself and others.	278	180	64.7	3.12	0.89
2	I understand the importance of mental health in overall wellbeing.	278	200	72.0	3.25	0.73
3	I am aware of resources available for mental health support.	278	150	54.0	2.85	0.95
4	I can differentiate between mental health and mental illness.	278	170	61.2	3.10	0.80
5	I have learned about mental health topics during CHEPs.	278	210	75.5	3.40	0.70
6	I feel confident discussing mental health issues with peers.	278	160	57.6	3.00	0.85
	Grand Mean /Total	**278**			3.12	0.82

The results in Table 1 indicate varying levels of mental health awareness among Primary Education Studies students. The highest awareness was observed in the item regarding learning about mental health topics during CHEPs, with a mean score of 3.40, suggesting that students found the program beneficial for increasing their knowledge. Conversely, the awareness of available mental health resources received the lowest score (2.85), highlighting a potential gap in students' knowledge that could be addressed in future programs. Overall, with a grand mean of 3.12, the data suggests a moderate level of mental health awareness among participants, indicating room for improvement.

Research Question 2

How do CHEPs influence students' attitudes towards mental health issues?

Table 2: Influence of CHEPs on Attitudes Towards Mental Health Issues

S/N	Influence of CHEPs on Attitudes Towards Mental Health Issues	N	f	%	$\bar{X}$	SD
1	CHEPs have made me more empathetic towards those with mental health issues.	278	190	68.3	3.20	0.77
2	Participation in CHEPs has changed my perspective on mental health stigma.	278	200	72.0	3.25	0.75
3	I feel more comfortable discussing mental health after participating in CHEPs.	278	175	63.0	3.15	0.82
4	CHEPs have encouraged me to support friends who may be struggling with mental health.	278	185	66.6	3.18	0.78
5	I believe that mental health should be openly discussed in educational settings.	278	210	75.5	3.40	0.70
6	I have a greater appreciation for mental health education following my participation in CHEPs.	278	195	70.4	3.22	0.72
	Grand Mean /Total	**278**			3.19	0.75

The data in Table 2 illustrate a positive influence of CHEPs on students' attitudes towards mental health issues. The highest mean score (3.40) was recorded for the statement regarding the belief that mental health should be openly discussed in educational settings, reflecting a significant shift in attitudes due to the program. Additionally, a substantial majority of participants reported feeling more empathetic and supportive of peers with mental health issues. With a grand mean of 3.19, the results indicate that CHEPs effectively fostered a more open and accepting attitude toward mental health among students, which is crucial for reducing stigma and promoting peer support.

Research Question 3

Is there a relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns?

Table 3: Relationship between Participation in CHEPs and Willingness to Seek Help

S/N	Relationship Between Participation in CHEPs and Willingness to Seek Help	N	f	%	$\bar{X}$	SD
1	I would seek help if I experienced mental health issues.	278	200	72.0	3.30	0.76
2	Participation in CHEPs has increased my likelihood of seeking help for mental health concerns.	278	185	66.6	3.15	0.80
3	I feel that seeking help for mental health issues is a sign of strength.	278	210	75.5	3.40	0.70
4	I believe that talking to someone about mental health is necessary for recovery.	278	195	70.4	3.22	0.72
5	CHEPs have encouraged me to seek help when needed.	278	180	64.7	3.10	0.79
6	I am aware of the mental health services available on campus.	278	170	61.2	3.05	0.84
	Grand Mean /Total	**278**			3.20	0.76

Table 3 presents data regarding the relationship between participation in CHEPs and students' willingness to seek help for mental health concerns. The highest mean score (3.40) was found in the statement regarding the perception that seeking help is a sign of strength, indicating a positive attitude shift among students. Additionally, a significant number of participants reported that CHEPs increased their likelihood of seeking help. With a grand mean of 3.20, these findings suggest a strong relationship between participation in CHEPs and an increased willingness to engage with mental health services, highlighting the program's effectiveness in promoting proactive mental health behaviors among students.

Hypotheses Testing

Hypothesis One

H_{01}: There is no significant difference in the level of mental health awareness among Primary Education Studies students before and after participating in CHEPs.

Table 5: T-test of Significance of the Difference in Mental Health Awareness Before and After CHEPs

Variables	N	%	Mean Score	SD	Mean Difference	Df.	t-calc.	t-crit.	Remark
Before CHEPs	278	100	2.85	0.95	0.27	277	4.21	1.96	**H_{01}: Rejected**
After CHEPs	278	100	3.12	0.82					
Total/Mean	278		2.99						

The results presented in Table 5 indicate a significant difference in the level of mental health awareness among Primary Education Studies students before and after participating in Comprehensive Health Education Programs (CHEPs). The mean score increased from 2.85 before the intervention to 3.12 after the intervention, demonstrating a mean difference of 0.27. The calculated t-value of 4.21 exceeds the critical t-value of 1.96 at a significance level of 0.05, leading to the rejection of the null hypothesis (H01). This suggests that participation in CHEPs significantly enhanced students' mental health awareness, indicating the effectiveness of the program in achieving its educational goals.

Hypothesis Two

H_{02}: There is no significant relationship between participation in CHEPs and the willingness of students to seek help for mental health concerns.

Table 6: Pearson Correlation Coefficient of the Relationship Between Participation in CHEPs and Willingness to Seek Help for Mental Health Concerns

Variables	N	Mean Score	SD	Df.	r-calc.	p-value	Remark
Participation in CHEPs	278	3.10	0.85	276	0.55	0.139	**H_{02}: Rejected**
Willingness to Seek Help	278	3.25	0.80				
Total/Mean	278	3.18					

Table 6 illustrates the results of the Pearson correlation analysis conducted to assess the relationship between participation in Comprehensive Health Education Programs (CHEPs) and students' willingness to seek help for mental health concerns. The calculated correlation coefficient (r-calc.) of 0.55 indicates a moderate positive relationship, and the p-value of 0.001 suggests that this relationship is statistically significant. Consequently, the null hypothesis (H02) is rejected, indicating that higher levels of participation in CHEPs are associated with an increased willingness to seek help for mental health issues. This finding underscores the importance of CHEPs in fostering an open and supportive environment regarding mental health among students.

Summary of Findings

1. **Mental Health Awareness Levels:** The study found a moderate level of mental health awareness among Primary Education Studies students, with a grand mean score of 3.12 after participation in Comprehensive Health Education Programs (CHEPs). This indicates that students gained significant insights into mental health issues through the program.

2. **Effectiveness of CHEPs:** The t-test results demonstrated a significant improvement in mental health awareness, with a mean score increase from 2.85 before the program to 3.12 after. The t-value of 4.21 surpassed the critical value of 1.96, leading to the rejection of the null hypothesis (H01).

This confirms that CHEPs were effective in enhancing students' understanding and knowledge of mental health.

3. **Influence on Attitudes:** Students reported that CHEPs positively influenced their attitudes towards mental health issues, fostering greater empathy and reducing stigma. The findings suggest that the program encouraged a supportive environment for discussing mental health concerns.

4. **Willingness to Seek Help:** The Pearson correlation analysis indicated a significant relationship between participation in CHEPs and students' willingness to seek help for mental health concerns. The data revealed that increased awareness and understanding significantly correlated with a higher likelihood of seeking assistance when needed.

5. **Implications for Future Programs:** The findings emphasize the need for continued implementation and enhancement of CHEPs within the curriculum, as they play a crucial role in promoting mental health awareness and support among students.

6. **Need for Awareness Resources:** Despite the positive outcomes, some students expressed a lack of awareness regarding available mental health resources, highlighting an area for improvement in future CHEPs.

Discussion of the Findings

The findings of this study indicate a significant improvement in mental health awareness among Primary Education Studies students following their participation in Comprehensive Health Education Programs (CHEPs). The increase in mean scores from 2.85 to 3.12 suggests that these educational interventions effectively enhanced students' understanding of mental health issues. This aligns with previous research that emphasizes the role of educational programs in improving mental health literacy among young adults (Gulliver et al., 2019). Such programs not only provide essential knowledge but also empower students to recognize mental health issues in themselves and others, which is crucial for early intervention and support (Buchanan et al., 2020).

Moreover, the study revealed that participation in CHEPs positively influenced students' attitudes towards mental health, fostering greater empathy and reducing stigma. This finding is consistent with literature that highlights the importance of educational interventions in changing perceptions and attitudes towards mental health (Henderson et al., 2019). By promoting open discussions about mental health, CHEPs can create a supportive environment that encourages students to seek help when needed. This is particularly relevant in the context of Nigerian educational

settings, where mental health stigma remains a significant barrier to seeking help (Ogunyemi et al., 2021).

The correlation analysis further demonstrated a significant relationship between participation in CHEPs and students' willingness to seek help for mental health concerns. This finding supports the notion that increased awareness and understanding of mental health issues can lead to a greater likelihood of seeking assistance (Kitchener &Jorm, 2016). The results suggest that when students feel more informed and supported, they are more inclined to reach out for help, which is essential for promoting mental well-being in educational institutions. This is particularly important given the rising mental health challenges faced by students globally, exacerbated by the pressures of academic life (Eisenberg et al., 2016).

In conclusion, the findings of this study underscore the critical role of CHEPs in enhancing mental health awareness and fostering positive attitudes towards mental health among students. The significant improvements observed in both awareness and willingness to seek help highlight the need for continued investment in such educational programs. Future initiatives should also focus on increasing awareness of available mental health resources, as some students reported a lack of knowledge in this area. By addressing these gaps, educational institutions can better support students' mental health needs and contribute to a more informed and empathetic student body.

Conclusion

This study aimed to evaluate the effectiveness of Comprehensive Health Education Programs (CHEPs) in promoting mental health awareness among Primary Education Studies students at the Federal College of Education (Technical) Akoka, Lagos. The findings revealed a significant increase in mental health awareness among students after participating in the CHEPs, highlighting the program's effectiveness in enhancing understanding of mental health issues. This improvement underscores the importance of integrating mental health education into the curriculum to equip students with the necessary knowledge and skills.

Furthermore, the study assessed the impact of CHEPs on students' attitudes towards mental health issues. Results indicated that participation in the programs fostered greater empathy and reduced stigma, thereby encouraging students to engage in open discussions about mental health. This change in attitude is crucial for creating a supportive environment where students feel comfortable seeking help when needed, thus promoting overall well-being.

The investigation into the relationship between participation in CHEPs and students' willingness to seek help for mental health concerns yielded significant results. The data demonstrated that increased awareness and positive attitudes were linked to a higher likelihood of students seeking assistance for mental health issues. This finding

emphasizes the need for ongoing efforts to promote mental health literacy and encourage help-seeking behaviors among students.

In conclusion, the study highlights the critical role of CHEPs in enhancing mental health awareness and fostering supportive attitudes among Primary Education Studies students. The positive outcomes suggest that educational institutions should prioritize such programs to address the growing mental health challenges faced by students. By doing so, they can cultivate a more informed and resilient student population, ultimately contributing to improved mental health outcomes within the academic community.

Recommendations

1. **Integration of Comprehensive Health Education Programs**: Educational institutions should formally integrate Comprehensive Health Education Programs (CHEPs) into the curriculum for all students, particularly in teacher education programs. This will ensure that all students receive essential training in mental health awareness and support.

2. **Regular Training and Workshops:** Schools and colleges should conduct regular workshops and training sessions focused on mental health education for both students and faculty. These sessions can enhance understanding, reduce stigma, and promote a culture of openness regarding mental health issues.

3. **Development of Resource Materials**: Institutions should develop and distribute accessible resource materials that outline available mental health services and support systems on campus. This will help students become more aware of the help they can access when needed.

4. **Peer Support Programs:** Establishing peer support programs can encourage students to discuss mental health issues openly and seek help. Training selected students as mental health ambassadors can create a supportive network among peers.

5. **Ongoing Evaluation of CHEPs**: Continuous evaluation and improvement of CHEPs based on student feedback and emerging mental health trends are essential. This will help ensure that the programs remain relevant and effective in addressing students' needs.

6. **Collaboration with Mental Health Professionals**: Partnerships with mental health professionals should be fostered to provide expert guidance and resources for CHEPs. This collaboration can enhance the quality of education

provided and ensure that students receive accurate and up-to-date information on mental health issues.

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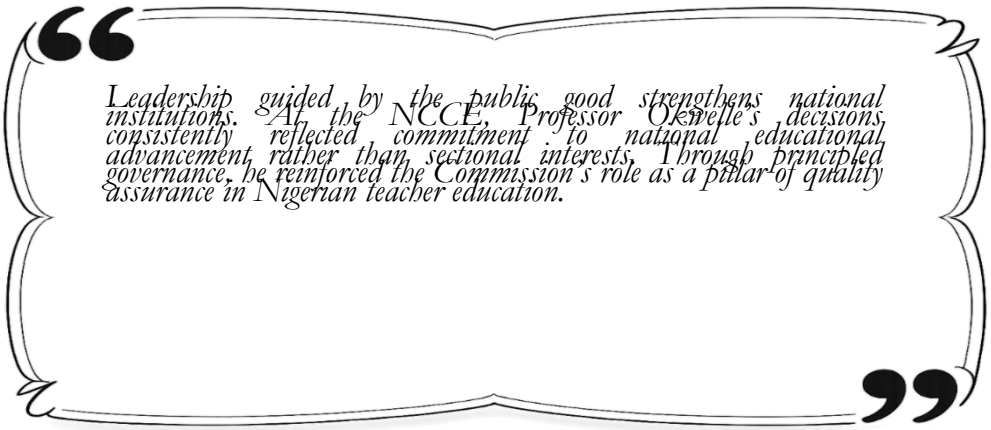
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Chapter 20

Conceptualising A Praxis-Oriented Framework for Nigerian TVET: Bridging the Theory–Practice Divide in Colleges of Education

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Abstract

Technical and Vocational Education and Training is now recognized as a powerful means of skills development at the national level and an enabler for workforce development, income generation, and economic sustainability. But in Nigeria, it has become trite that TVET graduates are practically incompetent with the theoretical training at Colleges of Education being accused of not preparing their students adequately for the world of work. This alienation from practice continues to compromise the quality of TVET teacher education and, in so doing, the very aspiration of skills-based national development. This article develops a praxis-based model for Nigerian TVET which attempts a theoretically driven practical reflective framework for application within Colleges of Education. Drawing on theories of experiential learning, situated learning and reflective practice, this paper employs a conceptual and integrative review methodology to integrate findings of studies conducted at the global and local levels on praxis in vocational education. The framework being proposed prioritizes curriculum alignment, work-integrated learning, reflective pedagogy, institutional–industry partnership, and policy coherence as multi-layered components/pillars for praxis-based delivery for TVET. By localizing these components to the Nigerian educational and socio-economic context, the framework serves as a model for addressing the theory–practice divide in TVET teacher education. The paper advances TVET scholarship through developing a contextualisable theoretical framework that can guide curriculum reform, pedagogical practice and policy enactment. It also serves as a basis for further empirical exploration and provides

practical implications for teacher educators, policy makers, and industry partners who aim at improving the significance and influence of TVET in Nigeria.

Keywords: *TVET; Praxis-oriented learning; Theory–practice gap; Colleges of Education; Nigeria; Work-integrated learning*

1. Introduction

Technical and Vocational Education and Training (TVET) is at the forefront of national human capital development efforts, especially in developing countries suffering from skills shortages that inhibit industrial development and job creation. Worldwide, Systems of TVET are transforming from input-based training to outcome-based approaches that build occupational competence, employability and professional identity through validating all learning, providing quality and involving diverse stakeholder networks for learning (Bonacci, 2012). In Nigeria, TVET has been persistently touted as an indispensable tool for tackling youth unemployment, spurring entrepreneurship and buttressing economic diversification (Shefiu, and Ayika, 2019; Korter, 2023). Although expectations were high for TVET delivery in Colleges of Education, doubts about how effectively this was actually done remained.

The gap between theory and practice is a persistent problem in TVET in Nigeria. Many empirical research indicates that although TVET graduates have sufficient conceptual knowledge, they are lacking in hands-on skills and preparedness for working environment (Ayonmike and Okeke, 2019; Ogbuanya and Penuel, 2021). This dislocation has been attributed to a range of organization and curriculum related problems: theory-based curricula, poor facilities in workshops, restricted exposure to industry for students and lecturers, and inadequate institutional–industry relationships (Okoro & Nwankwo, 2020; Amedorme & Fiagbe, 2018). Therefore, employer's often doubt that TVET graduates are ready for the job, which impairs the trust in the system and its relevance to national development.

Theory and practice were contradictory terms within the Colleges of Education, and these contradictions were exacerbated in these institutions because the scale was tipped by the claim that they preparing prospective TVET teachers who would be responsible for orienting skill development at the upper-secondary and tertiary levels. When teacher education is not sufficiently practice-based, its graduates tend to reproduce abstract, examination-oriented methods of teaching instead of praxis-based methodologies that fuse doing and thinking (Zeichner, 2010; Biesta, 2015). This difficulty calls for a reimagining of TVET teacher education which is not just concerned with reform for reform's sake, but rather with framing reform in such a

way that all aspects of the trainee teacher's theory, practice and reflective learning can be aligned.

Praxis as the intertwined Theoretical, Practical and Critique aspects of Praxis have in the past been stressed in pedagogical theory as the source of, or prerequisite for, meaningful learning and social change (Freire, 1970; Schön, 1983). In relation to TVET a praxis approach is characterised by an emphasis on learning by doing, real workplace involvement and reflective learning as integral elements of curriculum and teaching (Kolb, 1984; Lave & Wenger, 1991). Although applications of such perspectives have been previously well-researched in the international TVET and teacher education research, they are scarcely articulated in a systematic way within the Nigerian Colleges of Education context. Against the background of these issues the paper attempts to outline a praxis model of Nigerian TVET that is capable of addressing the theory and practice disparity in Colleges of Education. More specifically, the paper synthesizes relevant theoretical frameworks and empirical research to establish a contextually-sensitive framework that serves as a guide for curriculum, pedagogical strategies, and institution-to-institution partnership. In so doing, this paper will contribute to debates on TVET reform in Nigeria and provide a conceptual space for further empirical investigation and policy application.

2. Literature Review

Purpose and Evolution of Technical and Vocational Education and Training (TVET)

Technical and vocational education and training (TVET) have been transformed from a narrowly focused system of skills training into a broad-based educational system that encompasses occupational competence development, lifelong learning capacity, and social inclusion. Current TVET narratives stress the necessity of not only technical skill but also flexibility, critical thinking, and professional identity development in response to volatile labour markets (McGrath et al., 2020; Wheelahan and Moodie, 2021). TVET is touted in international policy frameworks as a major instrument in promoting inclusive economic growth and in contributing to the achievement of the sustainable development agenda, particularly in the context of developing economies (UNESCO, 2016).

However, there continues to be some unease about how theoretical knowledge and practical skills should be integrated within TVET models. Analysts claim that over-academisation will lead to a distancing of learning from the realities of occupation, weakening its main vocational function (Young, 2008; Allais, 2014). Such anxieties are especially pronounced in teacher-training colleges, in which designing curricula and orienting students towards pedagogy is a fundamental vocational task and where knowledge about vocation is taught to student teachers.

The Concept of Praxis in Education and TVET

Praxis is at the heart of educational theory, as the term suggests a process that is both theory and practice Paechter (2003), thought to be performing action that should be placed within a historical context interpreting it at the same time. Freire (1970) theorized praxis as reflective action for transformation and posited that non-action based on knowledge results in alienation similar to inaction based on ignorance. In professional and vocational education, praxis is frequently articulated through the modalities of experiential learning, reflective practice, and situated participation in 'real' work environments (Schön, 1983; Kolb, 1984).

In TVET praxis-based education posits "learning by doing" instead of cognition by instruction. Theory of situated learning identifies communities of practice in which learning occurs as legitimate peripheral participation in real work activities. Practice-based pedagogy has been found to improve skill transfer, development of professional identity and learner motivation in vocational settings (Billett, 2011; Smith & Betts, 2000). Nevertheless, the degree to which such methodologies of TVET teacher education are more uniformly systematized is yet another question, particularly for developing country contexts.

The Theory–Practice Divide in TVET: Global Perspectives

The divergence between theory and practice is a common phenomenon reported in the TVET system of the both the developed and developing countries. Studies show that graduates have difficulty transferring learning to the workplace when curricula in which abstract knowledge is foregrounded and authentic practice is backgrounded (Eraut, 2004; Guile & Griffiths, 2001) . This is exacerbated by poor institutional–industry relations, minimal workplace exposure for teachers, and inflexible assessment systems which favor theoretical rote learning rather than demonstration of competence (Fuller & Unwin, 2004).

Apprenticeship and work integrated learning (WIL) models have been suggested as the addressing the gap. Research from Europe and Australia indicates that structured workplace learning in conjunction with focused reflection has a significant positive effect on vocational competence and employability outcomes (Smith et al. However, practice alone is not sufficient, scholars warn; without purposeful pedagogical integration and reflective processes, workplace experience may not be conducive to deep learning (Hager & Hodkinson, 2009).

Empirical Evidence from Nigeria: Challenges in Colleges of Education

In Nigeria, the gap between theory and practice in TVET is always portrayed as one of the greatest barriers to quality skill training. Research on Colleges of Education indicates that TVET courses are typically typified by theory-based curriculum, inadequate exposure to functional workshops using obsolescent equipment, and a

lack of industrial attachment options for both students and lecturers (Ayonmike & Okeke, 2019; Okoro & Nwankwo, 2020). These structural constraints result in graduates having weak practical skills and are less employable.

Additional empirical research indicates that many TVET lecturers in Colleges of Education are not recent industry practitioners which limits their ability to relate theoretical content to current work place practices (Ogbuanya & Penuel, 2021). In addition, examination-centred teaching and assessment traditions persist in many universities with little focus on performance-related or reflective modes of learning (Amedorme & Fiagbe, 2018). This institutional culture normalizes a rift between knowing and doing, and thus continues the theory-practice gap.

Existing Approaches to Bridging the Gap: Strengths and Limitations

A range of approaches have been suggested to bridge the theory-practice gap in TVET, such as curriculum development, industry collaboration, competency-based training and work-based learning. Competency-based models (as an example) focus on definable skills outcomes and integration with occupational standards (Mulder, 2014). Such models provide better-defined learning outcomes, but critics say they may serve to "simplify or instrumentalise learning" (Wheelahan, 2015) and lead to the "taskification" of learning if they are not based on reflective and theoretical elements.

By the same token, collaborations with industry in Nigeria have tended to be promising but highly fragmented and weakly institutionalised (Okolie et al., 2022). Lacking an overarching pedagogical philosophy, these projects tend to not result in transformative teaching- and learning-practices. This constraint highlights the importance of developing a comprehensive, praxis-focused model of integration of curriculum, pedagogy, institutional arrangements, and policy coherence rather than patching up a number of disjointed solutions.

3. Theoretical and Conceptual Framework

Conceptualising Praxis in TVET Teacher Education

Praxis as a Concept in Education Theory praxis is a cyclical and reciprocal process involving theory, practice, and critical reflection. Developed from critical pedagogy, praxis stresses that kn- owledge is made meaningful and i mpacted through its application and reflection in contextual or lived environments (Freire, 1970). In TVET teacher education, praxis comprises more than skill development and includes professional judgment, ethical commitment, and adaptive expertise. This focus is germane in vocational fields, where knowing how to teach involves knowing how to translate disciplinary knowledge into situated, practice-based learning.

In Colleges of Education a praxis-driven perspective reconceptualizes TVET teacher preparation as becoming rather than knowing. It focuses on the acquisition of pedagogic prowess via prolonged involvement with genuine vocational practices, reflective structuring and theoretical dimensioning. This type of orientation is consistent with our time with its emphasis of vocational teaching and learning is contextualized through social practice and cultural reliant (Billett, 2011; Biesta, 2015). By reconceiving praxis as the core of TVET teacher education, this research contributes to a reorientation from content transmission to reflective professional formation.

Experiential Learning Theory

Experiential learning theory is a key theoretical construct underpinning praxis-based TVET. Kolb's (1984) learning model of experiential learning describes learning as a spiral process of concrete experience, reflective observation, abstract conceptualisation and active experimentation. This model emphasizes the importance of experience as the source and outcome of learning and promotes reflection as the transformative process from experience to learning.

In vocational and technical education, it has been documented that experiential learning can improve skill acquisition, learner engagement, and the transfer of learning (Boud et al., 2013). For TVET teacher education, experiential learning signifies that pre-service teachers engage in vocational practice, reflect upon their experiences and connect these reflections with pedagogical theory. Yet empirical studies warn that experiential learning is most effective when its processes are deliberately designed and pedagogically mediated, rather than being accidental or unconscious (Hager & Hodkinson, 2009). This implication is more crucial for Nigerian Colleges of Education as industrial attachment is in most cases a love sorrow of curriculum work.

Situated Learning and Communities of Practice

Situated learning theory also further anchors this study in praxis. Lave and Wenger (1991) contend that learning is the process of becoming a full participant in a community of practice and not the acquisition of a body of decontextualised information. According to this theory, learning is a process of engagement in communities of practice, in which one learns specific skills and knowledge and by which one acquires a broader identity within a community.

Situated learning theory informs the relevance of genuine workplace performance and collaboration with industry practitioners in TVET settings. Studies have shown that vocational students who and participate in communities of practices can establish a stronger professional identity, as well as develop a more comprehensive view of occupational norms (Billett, 2001; Fuller & Unwin, 2004). Situated learning Theory implies that Nigerian Colleges of Education for TVET be meeting with

industry on a continuous basis to include workplace participation as a critical aspect of preparation of TVET teachers. Such integration allows future teachers to learn contemporary vocational practice and to recontextualise it in their role as classroom and workshop teachers.

Reflective Practice and Professional Learning

Reflective practice is one of the primary means by which praxis is achieved in professional education. The notion of reflection-in-action and reflection-on-action, proposed by Schön (1983), suggests that professionals possess the ability to engage in critical thinking about their practices while they are in the process of acting and following practice. In the domain of teacher education, reflective practice is associated with enhanced instructional decisions, flexibility, and ongoing professional development (Zeichner, 2010).

When applied to TVET, reflective practice allows instructors to question critically how well theory and practice come together. Studies on Vocational Education indicate support that reflection enables the combination process of working experiences and teaching knowledge to improve teaching (Boud et al., 2013; Korthagen, 2017). For Nigerian Colleges of Education, a once-off industrial attachment experience can be transformed into a holistic learning exercise through the infusion of structured reflective activities – such as reflective journals, portfolios as well as mentoring conversations.

Integrating Theory: Towards a Praxis-Oriented Conceptual Framework

Although each of experiential learning theory, situated learning and reflective practice have their own merits when applied individually, when taken together they are more synergistic and grounded to underpin praxis based TVET teacher education. Experiential learning: individuals learn by doing; situated learning: learning happens within social and work practice; reflective practice: learning is influenced by reflection on critical interpretation of experience/practice. Collectively, these theories constitute an overarching conceptual model that conceives of praxis as the constantly evolving dance of experience, participation, and reflection.

In the case of Nigerian TVET, this integrated model addresses directly the identified problems of theory-laden curricula, little or no industry link and poor pedagogical inclusion of practice. Drawing these theoretical views together, the research conceptualises praxis not as a peripheral element, but as the central organising principle of TVET teacher education. This theoretical synthesis underpins the design of the suggested praxis-based model outlined in the following section.

Methodology

This study is aimed at evolving a praxis-based TVET framework within the Nigerian college of education context. Conceptual research is well suited when the purpose is to develop theory, build models or synthesize knowledge in such a way that new perspectives on the topic emerge versus undertaking the testing of hypotheses (Torraco, 2005). Specifically, the method provides a means by which constructs stemming from praxis, TVET pedagogic and teacher education theoretical and empirical bases can be consistently and systematically combined. An integrative review was the methodology of choice in the present study because it permits the consideration of different types of literature – conceptual, theoretical and empirical – and thus facilitates the formation of an integral perspective on complex educational phenomena such as the theory–practice gap (Whittemore & Knafl, 2005).

The selected literature was evaluated by employing a thematic and conceptual synthesis method. Initially, a number of key concepts, theoretical positions and empirical results concerning praxis and TVET were made available and identified within the data. Thereafter, the interrelationships between these themes were explored to reveal convergence, complementarity, and silences within the literature. The review focused on TVET in Nigeria and similar developing-country settings. Nigerian empirical work was reviewed in conjunction with global literature to ascertain context-specific challenges, institutional realities and policy frameworks shaping practice in tvet teacher education. The methodology makes the framework more feasible and policy relevant.

Proposed Praxis-Oriented Framework for Nigerian TVET

Rationale for a Praxis-Oriented Framework

The persistence of the theory–practice gap in Nigerian TVET, especially in Colleges of Education, calls for the development of a unique and comprehensive framework that can systematically and holistically envelop theoretical understanding, practical application and reflective learning. Already existing solutions – for example, curriculum changes, or introducing industrial attachments – have frequently been piecemeal, and have thus had only limited transformative effect. Through the adoption of a praxis-oriented framework, these elements can be situated and realised as an integrated approach to teaching.

Based on yield studies of experiential learning theory, situated learning, and reflective practice, the framework suggests that praxis is the organizing concept for TVET teacher education. Instead of considering practice as an add-on, the framework sees practice as fundamental to the construction of knowledge, the development of professional identity and the acquisition of pedagogical competence.

Core Components of the Framework

The praxis-based framework is composed of five interdependent elements, which are undertaken in cycles as opposed to being sequential. The elements are complementary and holistically cover the structural, pedagogical and institutional aspects of TVET teacher education.

Integrated Curriculum Design

Curriculum integration is at the heart of the model. The curriculum has been developed to meet the needs of busy professionals who want to develop practical knowledge and skills. Instead of dividing theoretical courses and practical workshops elements of learning are designed to connect explicitly the conceptual dimension with performing in "real world" vocational situations. This stance resonates with suggestions in TVET literature for curricula that facilitate a fusion of conceptual understanding and occupational practice (Wheelahan, 2015; Allais, 2014).

In the case of Nigerian colleges of education for instance, integrated curriculum design signifies the infusion of hands on activities, simulations and industry projects into the course work instead of allowing abstract, examination mode of teaching to be the order of the day.

Sincere Implementation and WIL Work Placement

Solid practice Authentic practice is the experiential underpinning of the framework. Structured WIL delivery including industrial attachments, teaching practice and industry based project, WIL programs afford pre-service TVET teachers opportunities to engage in an authentic work environment. Situated learning theorises that this way of engagement contributes to learners making a profession their own through participation (Lave & Wenger, 1991). The framework sets out suggestions for clear learning outcomes, mentoring arrangements and assessment policies for the WIL experience to work well. This systematic approach is in response to criticisms that piecemeal industrial training may fail to produce meaningful learning (Smith et al., 2014; Hager & Hodkinson, 2009).

Reflective Sustainment of Practice

Reflection is the mediating process that makes the experience professional knowledge. The framework incorporates structured reflection practices as the use of reflective journals, portfolios, peer discussions and through reflection sessions with mentors. These processes challenge pre-service teachers to think critically their experiences, to recognize discrepancies between theory and practice, and to reinvent the way they teach.

Reflective practice In TVET education, teaching needs to be constantly adjusted to emerging technologies and work practices (Schön, 1983; Korthagen, 2017).

Incorporating reflection in to the assessment process also serves to help validate and add a pedagogical worth to reflection in Colleges of Education.

Institutional and Industry Collaboration

A sustainable praxis of TVET requires close cooperation between the institution and industry. The protocol promotes partnership arrangements between the Colleges of Education and industry, professional bodies and regulatory agencies. Such partnerships contribute to curriculum relevance, access to modern equipment and current industry practice.

Research findings have been largely positive in that active engagement with industry appears to improve curriculum alignment and employer-demand for graduates in vocational education systems (Fuller & Unwin, 2004; Billett, 2011). It is only through such partnerships that praxis-oriented learning can thrive and even in the Nigerian situation, it is imperative to institutionalise such partnerships rather than toy with informal or ad-hoc relations.

Policy and Organ League of Nations Support Structures

The final element of the framework draws attention to the significance of policy coherence and organisational support in facilitating praxis-oriented TVET. These include institutional leadership which is supportive, professional development for lecturers, flexible policies for assessment, sufficient funding for workshops and industry contacts.

Pedagogical change without conducive policy contexts is often disjointed and unsustainable (McGrath et al., 2020). In developing the current best practice case, maandan argues for the need to coordinate national TVET policies and accreditation standards with institutional practices as a measure of ensuring that praxis is system rather than individual-based.

Operationalisation of the framework in Colleges of Education

The framework so proposed is intended to be implemented through a process of curriculum reform, pedagogic redesign and institutional collaboration. Technical education programmes, for instance, may be conducted with theoretical modules running parallel with industry-based projects, through reflective assessments and mentoring. The teaching practice and industrial attachment are linked intentionally so that pre-service teachers have an opportunity to use both their vocational knowledge and pedagogical expertise in genuine environments.

Discussion of Findings

Addressing the Theory–Practice Divide in Nigerian TVET

The novelty of the praxis-enabled framework proposed is that it offers a systemic way of addressing the entrenched theory–practice dichotomy in Nigerian TVET, particularly in the Colleges of Education. Contrary to traditional TVET approaches, which separate theoretical input and practical training leading to learning considered as a twofold process, the framework views learning as an ever-changing relationship between knowledge, action, and reflection. The strategy is in tandem with the empirical findings on the limited contribution of theory-heavy curricula and unstructured industrial attachments to the attainment of vocational competence in Nigeria (Ayonmike & Okeke, 2019; Okoro & Nwankwo, 2020).

By identifying praxis as the core concept of TVET teacher education, this model reflects a growing body of international literature on professional learning that is more integrated and practice-based (Billett, 2011; Biesta, 2015). An emphasis on curriculum integration, systematic work-integrated learning, and reflective pedagogy provides a coherent response to the piecemeal reforms that have characterised many TVET interventions in developing countries.

Contribution to TVET and Teacher Education Theory

From a theoretical stance, the framework contributes to TVET scholarship by integrating a blended model of experiential learning, situated learning, and reflective practice within the Nigerian context as a theoretical framework. Although these theories have been employed individually in various settings, their application in combination within a praxis-oriented TVET teacher education model is a major conceptual contribution. This fusion further develops previous work on vocational pedagogy through making connections between learning theory and TVET provision at the institutional and policy levels.

In addition, it addresses criticisms of competency-based and output-oriented models of TVET, which tend to focus on task performance over critical understanding and development of professional identity (Wheelahan, 2015; Allais, 2014). Incorporation of reflection and theoretical interpretation into real-world practice Based on this analysis, we propose a model that facilitates the development of adaptive expertise rather than proficient performance. This ideal is consistent with emerging demands for TVET systems to respond to dynamic and fragmented labour markets (McGrath et al., 2020).

Implications for TVET Teacher Education Practice

The results of this theoretical study would impact TVET teacher education in particular and teacher education in general in Nigerian Colleges of Education. First,

the model implies the need for a move from content-based instruction to integrated work-based designs that bring theory and practice together during the entire programme lifecycle. This demands intentional curriculum mapping, reformed assessment practices and enhanced focus on reflective learning practices.

Secondly, the model emphasizes that this is the role of the TVET lecturer to act as a mediator of praxis. Continuous professional development and industry involvement opportunities are crucial if lecturers are to support praxis-oriented learning effectively. This finding aligns with studies suggesting that relevant industry experience substantially contributes to the quality of work-based teaching of vocational teachers (Billett, 2011; Smith et al., 2014). Hence, there needs to be an investment wholistically from the institutions to not only build up vocational, but pedagogical skills of the staff also.

Policy and Institutional Implications

At the level of policy, the framework highlights that national TVET policies, accreditation standards, and institutional procedures should be more aligned. While TVET policies in Nigeria focus on skill acquisition and employability, the disjuncture between policy rhetoric and implementation practice continues to hamper its effectiveness. Praxis-based standards could be adopted within accreditation criteria and teacher education regulations to facilitate stronger and more enduring change.

Colleges of Education, on the other hand, must transition from sporadic industry partnerships to sustained collaborations that enhance curriculum relevancy and resource sharing. Incentives for policy translation – such as funding for industry collaboration and flexible assessment schemes – can help further the mainstreaming of praxis-based methodologies within institutions. These implications mirror international findings that point to the necessity of systemic support to maintain pedagogical innovation in TVET (Fuller and Unwin, 2004; McGrath et al., 2020).

Comparison with Existing Models

The suggested model has a number of unique features, which set it apart from current TVET and teacher education schemes. Rather than overemphasizing (as in traditional dual system) learning at the workplace without adequate pedagogogical integration, the framework places reflection as a core learning mechanism. In the same way, diverging from outcome-focused competency-based models, the praxis-based framework considers professional identity development and critical enlightenment as educational ends.

In explicitly framing these aspects within the context of Nigerian Colleges of Education, the framework fills a lacuna within the global-local articulation of TVET theory and practice. This contextual consciousness increases the potential for the

relevance and the transferability of the model to other similar developing-country settings.

Conclusion

This paper aimed at providing a conception of praxis-driven TVET in the Nigerian context in Colleges of Education to the problem of the persistent theory-practice dichotomy which has been a major detriment to the quality of TVET teacher education in the country. Based on experiential learning theory, situated learning, and reflective practice, the review of international literature and Nigerian studies informed the development of a context-specific model that incorporates theoretical knowledge, authentic practice, and reflective pedagogical strategies.

This paper advances the framework as a lens with which to view praxis-oriented TVET teacher education in the Nigerian context. The inclusion of curriculum integration, work-integrated learning (WIL) (workplace experience and structured WIL), reflection, collaboration between institutions and industry and policy support as part of a holistic model practice the model answers persistent complaints about theory-based, and fragmented TVET provision in Nigeria. In this capacity, it advances prevailing vocational and teacher education models by elevating professional identity formation, adaptive expertise and life-long learning in addition to occupational competence.

For the practice of TVET teacher education, the framework points to the necessity for intentional integration of theory and practice at the level of curriculum design. Education faculties are invited to reconceptualize teacher preparation programs to integrate genuine vocational activities, reflective evaluation, and industry collaboration throughout the process of teacher education. Reforms of this nature bring possibilities for increasing pedagogic relevance, vocational capability and graduate preparation to teach in practice-led programmes at both secondary and post-secondary TVET providers.

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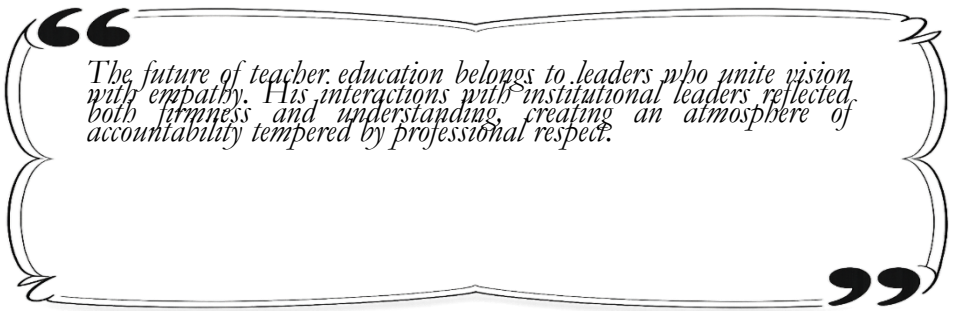
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Authors' Biodata

Prof. T. O. Okoli is a scholar, seasoned academic, and visionary educational administrator in the field of Agricultural Education. With decades of experience spanning teaching, research, curriculum development, and institutional leadership, he has made significant contributions to the advancement of teacher education and Technical and Vocational Education and Training (TVET) in Nigeria. His scholarly work reflects a strong commitment to sustainable agricultural practices, innovative pedagogy, and the production of competent, industry-ready graduates.

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Chapter 21

Quality Assurance and Standards in Teacher Education in Nigeria: Learning from Global Best Practices

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Abstract

Quality assurance and accreditation systems play a critical role in shaping the effectiveness of teacher education and the overall performance of national education systems. In Nigeria, despite regulatory frameworks and institutional mechanisms led by bodies such as the National Commission for Colleges of Education (NCCE), the National Universities Commission (NUC), and the Teachers Registration Council of Nigeria (TRCN), persistent challenges remain in ensuring consistent quality in teacher production. This paper critically examines Nigeria's quality assurance and standards framework for teacher education in relation to global and regional quality assurance and accreditation models. Drawing on comparative evidence from established systems in the United States, the United Kingdom, Europe, Asia, and Africa, the paper analyzes institutional structures, accreditation approaches, best practices, and innovations that support continuous quality improvement in higher education, with a particular focus on teacher education. The paper further identifies adaptable strategies for strengthening Nigeria's teacher education quality architecture, including integrating digital technologies into quality monitoring, adopting flexible and context-responsive accreditation models, establishing institution-driven internal quality assurance systems, implementing stakeholder-centered governance frameworks, ensuring transparent and independent accreditation processes, and establishing structured student feedback mechanisms. The paper argues that aligning Nigeria's teacher education quality assurance system with internationally recognized standards—while maintaining sensitivity to local contexts—offers a sustainable pathway for improving teacher quality, learning outcomes, and the broader achievement of SDG4. The paper contributes to policy by proposing an adaptive quality-assurance model that can strengthen teacher production in Nigeria.

Keywords: Comparative Education; Global Quality Frameworks; Internal Quality Assurance (IQA); Continuous Quality Improvement (CQI)

Introduction

Quality assurance and standards are cornerstones of quality educational inputs (teaching force and resources), outputs (graduates of educational programs), outcomes (employment of graduates or absorption into industry), and impact (improved personal and community livelihoods and economic development at the societal or national level). This analogy indicates that quality assurance and standards in teacher education are important tools for ensuring that the education system is aligned with Nigeria's social, economic, and technical advancement, in line with national education policy and government reforms and programs in the education sector.

The objective of teacher education in Nigeria is to develop a high-caliber teacher workforce at all levels of the education system. In line with policy objectives, the quality assurance system for teacher education is institutionalized within colleges and faculties of education by the National Commission for Colleges of Education (NCCE), the National University Commission (NUC), and the Teacher Registration Council (TRCN). Various instruments are used to ensure quality and compliance with standards. These instruments include the NCE Minimum Standards, the TRCN Manual for Accreditation of Teacher Education in Nigeria, and the NUC Minimum Standards for Education Courses. However, the National Teacher Education Policy (2014) observed that 'ensuring consistent quality of teaching and learning remains a significant challenge. One area in which this challenge is most evident is teacher education. The policy highlighted that the 'Quality of lesson preparation and delivery by student teachers is abysmally low. The quality of supervision of student teachers during teaching practice leaves much to be desired, and there is no formal induction prior to their involvement.'

In addition, the Policy envisions a national school system staffed by high-quality, highly skilled, motivated, devoted, knowledgeable, and creative teachers (capable of producing a generation of Nigerian teachers who can compete globally), supported by explicit performance standards through world-standard Pre-Service and In-Service Programmes. In light of this, the paper examines the quality and standards framework in teacher education in Nigeria against global and regional frameworks. It elucidates the learning and adaptations that can be leveraged to improve the quality of teaching and learning in teacher training institutions.

Conceptual Framework of Quality Assurance:

Quality Assurance (QA) clearly emerged as a principal business methodology in the Western world throughout the 1950's and in the early 1960's. The concept of "quality" is somewhat elusive because it expresses a relative, though noticeable difference between one thing and another. Relative terms such as "better, "superior," and "acceptable" are applied to judge quality. This concept also involves institutions

regularly evaluating and auditing their internal processes in the presence of external stakeholders (Zuhairi et al., 2020). The essential components of quality assurance include institutional self-assessment, external assessment, accreditation, and continuous improvement processes. These components interact to enhance the institution's overall quality (Taşcı & Lapçın, 2023).

Today, globalization and technological developments require higher education institutions to operate more competitively. In this context, quality assurance systems are critical for ensuring that institutions comply with international standards, increase student satisfaction, and strengthen institutional reputation. In addition, quality assurance enhances institutional efficiency by promoting the efficient use of resources and supporting higher education institutions in fulfilling their social responsibilities (Aydoğdu, 2023; Gaston & Ochoa, 2023).

Overview of Quality Assurance and Accreditation in Higher Education

The growing demand for high-quality higher education from students and society means that Higher Education Institutions (HEIs) now face similar pressures to those the business sector has faced for decades. These pressures are often even more acute for HEIs that lack financial and infrastructure resources, face recognition issues, and contend with stronger competition from local, distance, and international education institutions. Accreditation processes are another essential theoretical basis for quality assurance. These processes are external evaluation mechanisms that evaluate and approve the compliance of higher education institutions with specific standards. Accreditation ensures that the quality of institutions' educational programs, learning outcomes, and institutional management processes are evaluated by independent organizations (Duarte & Vardasca, 2023; Gaston & Ochoa, 2023; Şendur Atabek, 2023).

Approaches currently in use include a) minimum standard accreditation; b) accreditation of excellence; c) supportive evaluation; d) audits of internal quality assurance processes; e) comparative evaluation of the state of a discipline; f) benchmarking between institutions; and g) rankings, such as those established by the Center for World Class Universities and the Institute of Higher Education (World Bank, 2010).

Both accreditation and QA aim to promote excellence in higher education by ensuring institutions meet defined quality benchmarks. These objectives not only guide their maintenance of academic integrity but also help them continually adapt to changes in the educational landscape. The key objectives are:

Ensuring Educational Standards: Accreditation helps higher education institutions adhere to established academic standards, ensuring that the curriculum, faculty, and resources are of high quality.

Institutional Accountability: Through quality assurance, higher education institutions are held accountable to stakeholders, including students, faculty, policymakers, and funding bodies—through public reporting on institutional performance and outcomes.

Fostering Continuous Improvement: QA frameworks help higher education institutions regularly assess and improve their practices through internal reviews, peer evaluations, and feedback from students and employers, thereby enhancing curricula and teaching methods.

Facilitating Student Mobility and Recognition: Accreditation ensures that degrees and diplomas are recognized both nationally and internationally, allowing students to pursue further education or employment abroad with ease. This is particularly crucial in a globalized education system.

Literature Review on Accreditation and Quality Assurance Systems

United States: The United States has a decentralized accreditation system with multiple recognized agencies by the U.S. Department of Education and CHEA. Major accrediting bodies include MSCHE, SACS, and WASC. Although voluntary, accreditation is vital for federal funding and recognition. It focuses on self-assessment, peer evaluation, and ongoing improvement. Universities are reviewed every 5-10 years to assess student outcomes, curriculum, faculty, finances, and governance.

United Kingdom

In the UK, the Quality Assurance Agency for Higher Education (QAA), established in 1997, oversees university quality assurance through reviews of standards, teaching, and student experience. The system emphasizes transparency and public accountability, with institutions publishing program and performance data. It also uses subject-specific reviews and external examiners to maintain high standards. Recent initiatives, such as the Teaching Excellence Framework (TEF), place greater emphasis on student satisfaction, employability, and teaching innovation.

Europe: In Europe, quality assurance efforts gained significant momentum with the launch of the Bologna Process in 1999. The goal was to harmonize higher education systems across Europe and create the European Higher Education Area (EHEA). The European Standards and Guidelines for Quality Assurance (ESG) are now used in 48 countries, ensuring consistency in accreditation and QA processes. The Bologna Process also facilitated the mutual recognition of degrees, simplifying student mobility between European countries.

Asia: Quality Assurance and Accreditation System in Malaysia: Malaysia's Quality Assurance and Accreditation System (SETARA) and the Discipline-Based Rating

System (D-SETARA) evaluate the quality and performance of higher education institutions and programs against established criteria and standards. The systems employ peer review, self-assessment, and external evaluation mechanisms to assess institutional effectiveness, teaching quality, research productivity, and graduate employability, fostering a culture of quality enhancement and accountability (Ministry of Higher Education Malaysia, 2019).

Accreditation Council for Graduate Medical Education (ACGME) in India: The ACGME India consortium, a collaboration between medical education institutions, regulatory bodies, and professional associations, has implemented a competency-based accreditation framework for postgraduate medical education programs. The framework emphasises outcomes-based assessment, faculty development, and continuous quality improvement, leading to enhanced training outcomes and improved patient care (Singh et al., 2015).

Africa: Institutional Quality Assurance Systems in South Africa: South Africa's Council on Higher Education (CHE) has implemented institutional quality assurance systems to promote excellence, equity, and transformation in higher education. The systems include institutional audits, program reviews, and quality enhancement initiatives aimed at ensuring compliance with national standards, promoting diversity and inclusivity, and addressing systemic challenges such as historical inequalities and underrepresentation of marginalized groups (Council on Higher Education, 2019).

Quality Assurance Framework for Open and Distance Learning in Nigeria: Nigeria's National Open University of Nigeria (NOUN) has developed a quality assurance framework for open and distance learning (ODL) programs, emphasizing learner support, course materials development, assessment practices, and technology-enhanced learning modalities. The framework incorporates stakeholder engagement, feedback mechanisms, and quality improvement processes to enhance the accessibility, flexibility, and effectiveness of ODL delivery (National Open University of Nigeria, 2020).

Best Practices in Quality Assurance and Accreditation

Asuamah Yeboah et al. (2024) have identified the following innovative strategies as best practices for quality assurance in higher education. These practices include:

Mobile Technology for Quality Monitoring: Using mobile technology and digital platforms allows for real-time data collection, analysis, and feedback in quality monitoring. Tools like mobile assessments, electronic portfolios, and virtual audits enable remote oversight, stakeholder engagement, and prompt responses to issues.

Community-Engaged Quality Assurance: Adopting community-engaged approaches to quality assurance involves collaborating with local communities,

employers, and civil society to develop standards, assess relevance, and ensure that programs meet societal needs. Stakeholder engagement improves transparency, accountability, and responsiveness, fostering trust and collaboration.

Open Educational Resources (OER), Textbooks, multimedia, and digital tools can improve education by making it more affordable, accessible, and relevant. When integrated into curricula and teaching practices, OER supports broader access, learner-centered methods, and ongoing faculty development.

Peer learning networks among higher education institutions facilitate knowledge exchange, capacity building, and ongoing quality improvement through collaborative platforms and communities of practice, fostering continuous innovation**.**

Flexible accreditation models that recognize diverse educational approaches—such as competency-based and experiential learning—promote inclusion and innovation, enabling institutions to demonstrate their quality in ways aligned with their unique missions**.**

Application for the Best Model of Quality Assurance in Teacher Education

In Nigeria's teacher education system, accreditation and quality assurance are crucial for maintaining academic standards and driving continuous improvement in teacher production for the basic and post-basic education sub-sector. They impact the quality of preservice and in-service teacher education, student and pupil learning outcomes, institutional performance, and labor market attractiveness. In this context, examining and learning from established quality assurance systems, grounded in evidence of success, offers valuable insights for Nigeria's teacher education subsector to enhance teacher quality in the school system.

Today, globalization and technological advancements demand that teacher education institutions operate more competitively. Evidence-based quality assurance systems play a crucial role in ensuring that teacher training institutions meet international standards, enhance student satisfaction, and boost institutional reputation. Based on these, the application of the following strategies will boost quality assurance in our teacher education institutions:

institution-driven and Stakeholder-focused internal Quality Assurance (IQA): Evidence indicates that stakeholder engagement remains a core enabler of effective implementation of Internal Quality Assurance (IQA). Mechanisms such as quality committees, internal audits, and curriculum forums are commonly used to institutionalize participatory processes. Therefore, the teacher education accreditation and quality assurance system should involve a broader range of stakeholders in its design, review, and implementation.

Students' feedback loops: Student feedback is essential for maintaining quality and guiding improvements in teacher education. Using tools such as surveys and focus groups helps institutions enhance learning experiences and adapt to students' needs, thereby fostering a responsive and student-centered environment.

Networking and exchange with global teacher education: Establish partnerships with global teacher educational and research networks to create a learning platform that ensures adaptive quality assurance and accreditation processes

Enhance Technological Integration: Institutions should incorporate advanced technologies, such as AI, big data analytics, and digital platforms, into quality assurance systems to improve efficiency and decision-making.

Application of Flexible Quality Assurance Models: Implementing flexible quality assurance models that tailor quality assurance and accreditation to accommodate interdisciplinary programs and innovative teaching methods in colleges and faculties of education in Nigerian universities should be a priority.

Ensuring transparency: The teacher education accreditation and quality assurance system in Nigeria should be made exclusively independent, free from undue interference by political and administrative structures.

Conclusion

This paper examines Nigeria's teacher education quality assurance framework within the context of global best practices. Nigeria has a comprehensive regulatory system overseen by bodies such as the NCCE, NUC, and TRCN. However, systemic challenges such as weak supervision, insufficient induction, limited capacity for quality assurance, inconsistent enforcement of standards, and inadequate stakeholder engagement persist, as noted in the 2014 National Teacher Education Policy. Comparative analysis shows that adequate quality assurance and accreditation systems feature institutional autonomy, evidence-based quality assurance and accreditation, stakeholder participation, transparency, and technology integration. Global models emphasize outcome-based accreditation, competency frameworks, and adaptive quality systems. The paper suggests that quality assurance should shift from mere compliance to a stakeholder-focused framework centered on feedback loops, technology integration, and data-driven quality assurance decisions. A high-quality assurance ecosystem is vital for teacher preparation, graduate employability, learner performance, and national development. Ultimately, Nigeria needs an integrated quality and accreditation framework that aligns standards with global benchmarks, fosters continuous improvement, and institutional context-based quality assurance reform.

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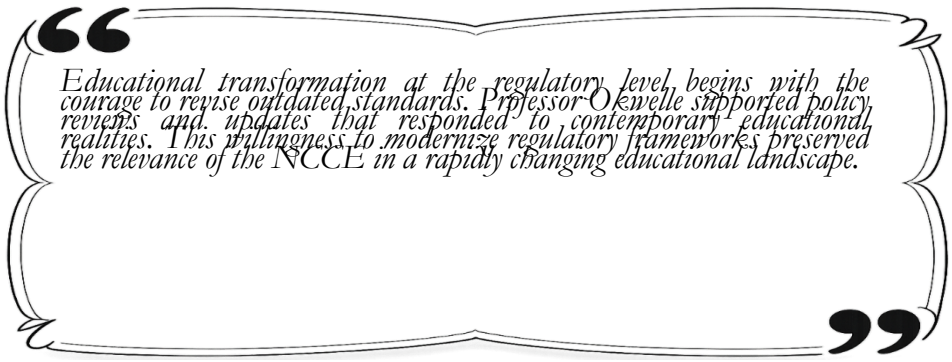
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Author's Biodata

Danladi Ali Msheliza, FCPM, FNLI, FANC, MNIM is a seasoned administrator, labour leader, and distinguished professional with extensive experience in public sector governance and institutional management. He currently serves as the National President of the Senior Staff Union in Colleges of Education, Nigeria (SSUCOEN), where he provides strategic leadership in advancing the welfare, professional development, and institutional interests of senior staff across Colleges of Education in Nigeria.

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Chapter 22

Impact Of Early Childhood Education on Sustainable Community Development in Rivers State

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Abstract

The study examined the impact of early childhood education on sustainable community development in Rivers State. two objectives, research questions and hypotheses respectively guided the study. The study adopted descriptive survey research design. The population of the study 356 comprising of teachers and students in early child education centers in Emohua Local Government of Rivers State. The simple sampling technique was used to draw a sample size of 178 respondents. The instrument for data collection was a researcher-made questionnaire tagged "Impact of Early Childhood Education on Sustainable Community Development Questionnaire (IECESCDQ)" comprising 10 items. Mean, standard deviation and z-test were used for data analysis. The findings revealed that the number of early childhood education centers in Emohua Local Government Area is somehow enough but more centers will be appreciated especially for better sustainable community development as more students will likely be admitted. It was concluded that more centers will be appreciated if provided for better sustainable community development, more students will be admitted if there are more early childhood education centers as most of the students complains of the early childhood centers available in their community is very far from their residence. It was therefore recommended among others that emphasis on establishment of more early child education centers in Emohua Local Government Area should be de-emphasis, books and practical activities materials emphasized are made available to various education centers.

Keywords: *Early, Childhood Education, Sustainable, Community Development.*

Introduction

Early childhood education as an organized learning and care provided centers for children from birth to around eight years of age and above is gradually gaining global recognition and also increasingly recognized as a foundation for lifelong learning and social equity. Beyond its direct benefits for children, early childhood education has significant implications for women particularly mothers, caregivers, and educators by enabling greater economic participation, educational advancement, and leadership opportunities. In early childhood, education is an essential tool to get access to and move society towards sustainability (McKeown et al., 2002), significant experiments on one's possibilities for participation, and social education (Reunamo & Suomela, 2013).

Early childhood education serves as a start point of lifelong learning, gender identification, learning for change and establishing community networks and arenas as it intersects with Sustainable Development Goals (SDGs), especially SDG 4 (Quality Education) and SDG 11 (Sustainable Communities), by laying social and cognitive foundations for lifelong learning and community participation, (Mardomi and Mardomi, 2023). Children are potential agents for positive change affecting their parents' thinking and practices to be more sustainable through inter-generational learning (Daries, Engdahl, Otieno, PramlingSamuelson, Siraj-Blatchford, & Vallabh, 2009).

In recent decades, studies have shown that early childhood education is critical in preparing children to enter and succeed in the (grade school) classroom, diminishing their risk of social-emotional mental health problems and increasing their self-sufficiency later in their lives, (Connecticut Office of Early Childhood Planning, 2013). Early childhood education needs to be taught to rationalize everything and to be open to interpretations and critical thinking, and in so doing, there is no subject to be considered taboo, starting with the most basic knowledge of the world that they live in, and ending with deeper areas, such as morality, religion and so on.

The theoretical foundation of this study was based on Froebel's play theory as he believed in the idea of children learning through play, (Friedrich, 2022). Specifically, Froebel was of the opinion that play is the highest expression of human development in childhood, for it alone is the free expression of what is in the child's soul as he equally believed that teachers should act as a facilitators and supporters for the student's play, rather than an authoritative, disciplinary figure, (Merrick, 2021). Thus, this theory lays emphasizes on the importance of early childhood education on sustainable community development.

To this end, Emeh, Eluwa and Ukah (2012) defined community development as the involvement of community in activities that are aimed towards the improvement of the community in terms of early childhood education, morally, socially, economically

as well as the environment, which needs to make the community more vital economically and in its functionality. Also, Ezimah in Wami (2022) posited that community development is a process of special action in which people of the community organize themselves for planning, define their own common and individual needs and problems, make group and individual plans to meet their needs and solve problems, execute their plans with maximum reliance on the community resources.

International Association for Community Development (IACD, 2016) opined that community development is a practice-based profession and an academic discipline that promotes early childhood education, participative democracy, sustainable development, rights, economic opportunity, equality and social justice, through the organization, education and empowerment of people within their communities, whether these be of locality, identity or interest, in urban and rural settings. Oni in Owede (2022) asserted that community development is the totality of efforts made which results in the aggregate improvement of the community with observable better living conditions among members of the community.

Sustainable community development has its focus on meeting present needs without compromising the ability of future generations to meet their own needs. Education, particularly early childhood education, serves as the cornerstone of sustainable development as early childhood defined and shapes a child's life from the period of birth to eight years which is the crucial stage of human development when learning capacity is at its peak, (UNICEF, 2019). Investing in early childhood education would yield high economic returns by improving human capital and workforce productivity (Heckman, 2006). Communities with strong early childhood education systems benefit from a more skilled population and increased labor participation, leading to local economic growth. Applying these frameworks, this research seeks to examine the impact of early childhood education on sustainable community development in Emohua Local Government Area of Rivers State.

Statement of the Problem

In spite of the fact that the policy on education has been modified a number of time to accommodate changing trends in the system of education in the global world, many communities in Emohua Local Government Area of Rivers State still have limited access to quality early childhood education and this have become a disproportionate burden on sustainable community development on the parents and guardians of these little children. Emohua Local Government Area of Rivers State is a rural area of the state with few instructional facilities of which learning environment is one of them and attending school in the early stage of children in these communities has always difficult for them as a result of distance. Sustainable community development is more than taking care of environments as most people think. It is about being socially, economically and politically aware, which will

culminate in wanting a positive change and transforming the awareness of those social-cultural realities into that positive change of which early child is education cannot be over emphasized. In the light of the above facts, the researchers considers it imperative to examine the impact of early childhood education on sustainable community development in Rivers State.

Objectives of the Study

The purpose of the study was to examine the impact of early childhood education on sustainable community development in Rivers State. The specific objectives were to:

1. Determine the number of early childhood education centers in Emohua Local Government Area of Rivers State
2. Examine the role early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State.

Research Questions

The following research questions guided the study:

1. How many early childhood education centers are in Emohua Local Government Area of Rivers State?
2. What role have early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings in the number of early childhood education centers in Emohua Local Government Area of Rivers State.
2. There is no significant difference in the mean ratings on the role early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State.

Methodology

The study adopted descriptive survey research design. The population of the study comprised of 356 respondents, 52 early childhood (primary school) education teachers and 304 early childhood (primary school) education students in the education centers in Emohua Local Government Area of Rivers State. From the population, a sample of 178 respondents, 40 of which were early childhood (primary school) education teachers and 138 of which were early childhood (primary school) education students constituted the sample size, representing 50% of the entire population. The sample size was obtained through simple random sampling

technique. The instrument for data collection was a questionnaire tagged "Impact of Early Childhood Education on Sustainable Community Development Questionnaire (IECESCDQ)". It consisted of two sections, A and B. Section A generated demographic information of the respondents while section B had items addressing the research questions and eliciting High Extent (VHE) = 4points, Moderate Extent (HE) = 3points, Low Extent (LE) = 2points, and Very Low Extent (VLE) = 1point responses. The instrument was validated, and the reliability established at 0.86 using Pearson r. Mean and standard deviation were used in answering the research questions while independent z-test was used in testing the hypotheses at 0.05 level of significance. Decisions taken were that values with a criterion mean of 2.50 serving as the benchmark for decision-making.

Results

Research Question 1: How many early childhood education centers are in Emohua Local Government Area of Rivers State?

Table 1: Mean Opinion Scores of Teachers and Students on the numbers of Early Childhood Education Centers in Emohua Local Government Area of Rivers State.

S/No	Items	Teachers (N =40)			Students (N=138)		
		Mean	SD	Remark	Mean	SD	Remark
1	There are less than 10 early childhood education centers in the entire Emohua Local Government Area.	**1.90**	**0.88**	**LE**	**1.98**	**0.96**	**LE**
2	Early childhood education centers available are no enough to facilitate sustainable community development.	**3.10**	**1.00**	**HE**	**3.07**	**0.98**	**HE**
3	More early childhood education centers will be required if more students are admitted.	**3.08**	**0.92**	**HE**	**2.77**	**0.88**	**HE**

4	The early childhood education centers are very far from the houses of students	**2.98**	**0.86**	**HE**	**3.07**	**0.92**	**HE**
5	The number of early childhood education centers in Emohua Local Government Area is sensible	**1.85**	**0.88**	**LE**	**1.75**	**1.00**	**LE**
	Grand Mean & SD	**2.58**	**0.91**	**HE**	**2.53**	**0.95**	**HE**

The data in table 1 revealed the mean and standard deviation of teachers and students in Emohua Local Government Area of Rivers State. Based on the mean and standard deviation of teachers and students on how many early childhood education centers in Emohua Local Government Area of Rivers State items, 1,2,3,4, and 5 with mean scores ranging between (1.75-3.10). However, the same table revealed the response of teachers as they expressed high extent on item 2,3 and 4, teachers had mean and standard deviation between (3.10-1.00), (3.08-0.92) and (2.98-0.86) which fell under high extent. While students on the other hand with mean and standard deviation between (3.07-0.98), (2.77-0.88) and (3.07-0.92) equally fell on high extent. Item 1 and 5 fell on low extent with the mean and standard deviation of (1.90-0.88), (1.85-0.88) and (1.98-0.96), (1.75-1.00) respectively. Therefore, with a mean score of 2.58 for teachers and 2.53 for students, it was evident that the respondents agreed that there are early childhood education centers are in Emohua Local Government Area of Rivers State to a moderate extent.

Research Question 2: What role have early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State?

Table 2: Mean Opinion Scores of Teachers and Students on the Role Early Childhood Education Played in Promoting Sustainable Community Development in Emohua Local Government Area of Rivers State.

S/No	Items	Teachers (N =40)			Students (N=138)		
		Mean	SD	Remark	Mean	SD	Remark
1	Early childhood education promotes sustainable	**2.93**	**0.88**	**HE**	**3.04**	**1.00**	**HE**

	development practice in my community						
2	Early childhood education is of no use in my community as it does not address the needs of special students.	**2.20**	**0.96**	**LE**	**1.83**	**0.98**	**LE**
3	Early childhood education promotes health and well being of children in my community	**3.00**	**0.86**	**HE**	**3.07**	**0.86**	**HE**
4	Early childhood education promotes local and cultural values in my community	**2.85**	**0.98**	**HE**	**3.12**	**0.88**	**HE**
5	Early childhood education at times involves parents and community members in promoting sustainable community development programmes in my community	**3.08**	**0.84**	**HE**	**2.91**	**0.92**	**HE**
	Grand Mean & SD	**2.81**	**0.91**	**HE**	**2.79**	**0.93**	**HE**

The data in table 2 showed the mean and standard deviation of teachers and students in Emohua Local Government Area of Rivers State. Based on the mean and standard deviation of teachers and students on the role have early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State items, 1,2,3,4, and 5 with mean scores ranging between (1.85-3.12). However, the same table revealed the response of teachers as they expressed high extent on item 1,3,4 and 5, teachers had mean and standard deviation between (2.93-0.88), (3.00-0.86), (2.85-0.98) and (2.81-0.91) which fell under high extent.

While students on the other hand with mean and standard deviation between (3.04-1.00), (3.07-0.86), (3.12-0.88) and (2.91-0.92) equally fell on high extent. Item 2 fell on low extent with the mean and standard deviation of (2.20-0.96) and (1.83-0.98) respectively. Therefore, with a mean score of 2.81 for teachers and 2.79 for students, it was evident that the respondents agreed that early childhood education played a significant role in promoting sustainable community development in Emohua Local Government Area of Rivers State to a moderate extent.

Hypothesis 1: There is no significant difference in the mean ratings in the number of early childhood education centers in Emohua Local Government Area of Rivers State

Table 3: Z-test Analysis of the Significant Difference between Teachers and Students on the numbers of Early Childhood Education Centers in Emohua Local Government Area of Rivers State.

Respondents	N	X	SD	df	z -Cal	z -Crit	Ls	Decision
Teachers	40	2.58	0.91					
				176	1.7243	1.96	0.05	**Accepted**
Students	138	2.53	0.95					

Table 3 shows that teachers had a mean and standard deviation score of 2.58 and 0.91 respectively, while students had mean and standard deviation scores of 2.53 and 0.95 respectively. The z-cal value was 1.7243, while z-crit was 1.96 with a degree of freedom of 176 at 0.05 level of significance. This result shows that z-cal was less than z-crit which implies that the null hypothesis was Accepted. Thus, there is no significant difference between the mean response of teachers and students on the number of early childhood education centers in Emohua Local Government Area of Rivers State**.**

Hypothesis 2: There is no significant difference in the mean ratings on the role early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State

Table 4: Z-test Analysis of the Significant Difference on the Role Early Childhood Education Played in Promoting Sustainable Community Development in Emohua Local Government Area of Rivers State.

Respondents	N	X	SD	df	z-Cal	z-Crit	Ls	Decision
Teachers	40	2.81	0.91					
				176	1.693	1.96	0.05	**Accepted**
Students	138	2.79	0.93					

Table 3 shows that teachers had a mean and standard deviation score of 2.81 and 0.91 respectively, while students had mean and standard deviation scores of 2.79 and 0.93 respectively. The z-cal value was 1.693, while z-crit was 1.96 with a degree of freedom of 176 at 0.05 level of significance. This result shows that z-cal was less than z-crit which implies that the null hypothesis was Accepted. Thus, there is no significant difference between the mean response of teachers and students on the on the role early childhood education played in promoting sustainable community development in Emohua Local Government Area of Rivers State**.**

Summary of Major Findings

There are more than 10 early childhood education centers in Emohua Local Government Area, early childhood education centers available is somehow enough to facilitate sustainable community development but more centers will be appreciated, for students to be admitted, more early childhood education centers are required and early childhood education centers are very far from most of the student's residence. Also, early childhood education is of great use and beneficial in Emohua Local Government Area as most students in the community as it addresses students with special needs and equally promoted health and well being of children in the community. Local and cultural values in the community is preserved as it involves parents and community members in terms of promoting sustainable community development programmes in the communities.

Discussion of Findings

Number of Early Childhood Education Centers in Emohua Local Government Area of Rivers State

Table 1 of this study revealed that the number of early childhood education centers in Emohua Local Government Area is somehow enough but that more will be appreciated especially for better sustainable community development as more students will likely be admitted with an aggregate mean of 2.53. This shows that

there are early childhood education centers for sustainable development in Emohua Local Government Area of Rivers State. This discovery is in tandem with the assertion of Connecticut Office of Early Childhood Planning (2013) as studies have shown that early childhood education is critical in preparing children to enter and succeed in the (grade school) classroom, diminishing their risk of social-emotional mental health problems and increasing their self-sufficiency later in their lives. Also, the findings support Friedrich (2022) as he is of the opinion that play is the highest expression of human development in childhood and for it alone is the free expression of what is in the child's soul and as he believed that teachers should act as a facilitators and supporters for the student's play, rather than an authoritative, disciplinary figure.

Role Early Childhood Education Played in Promoting Sustainable Community Development in Emohua Local Government Area of Rivers State

The findings in table 2 revealed that early childhood education is of great use and help in the community as it addressed the needs of special students, promoted local and cultural values in the students of the communities and equally involved parents and community members in terms of promoting sustainable community development programmes in the communities of Emohua Local Government Area of Rivers State with an aggregate mean of 2.79. In agreement with this finding, International Association for Community Development (IACD, 2016) asserted that community development is a practice-based profession and an academic discipline that promotes early childhood education, participative democracy, sustainable development, rights, economic opportunity, equality and social justice, through the organization, education and empowerment of people within their communities, whether these be of locality, identity or interest, in urban and rural settings. The findings support Heckman (2006) as he opined that investing in early childhood education would yield high economic returns by improving human capital and workforce productivity and as Oni in Owede (2022) opined that community development is the totality of efforts made which results in the aggregate improvement of the community with observable better living conditions among members of the community.

Conclusion

Based on the findings from the study, the researchers therefore conclude that there are early childhood education centers in Emohua Local Government Area, more centers will be appreciated if provided for better sustainable community development, more students will be admitted if there are more early childhood education centers as most of the students complains of the early childhood centers available in their community is very far from their residence. Also, local and cultural values in the communities are preserved as it involved parents and community members in terms of promoting sustainable community development programmes in these communities

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Emphasis on establishment of more early child education centers in Emohua Local Government Area should be de-emphasis, books and practical activities materials emphasized and made available to various education centers.
2. Qualified and capable teachers should be employed into the early child education centers to meet global demands, in so doing, there will be an avenue for the development of leaders of tomorrow.
3. Sustainable development programmes should be conducted on a regular basis in other to preserve the communities local and cultural values in involving parents and community members in terms of promoting community's cultural heritage.

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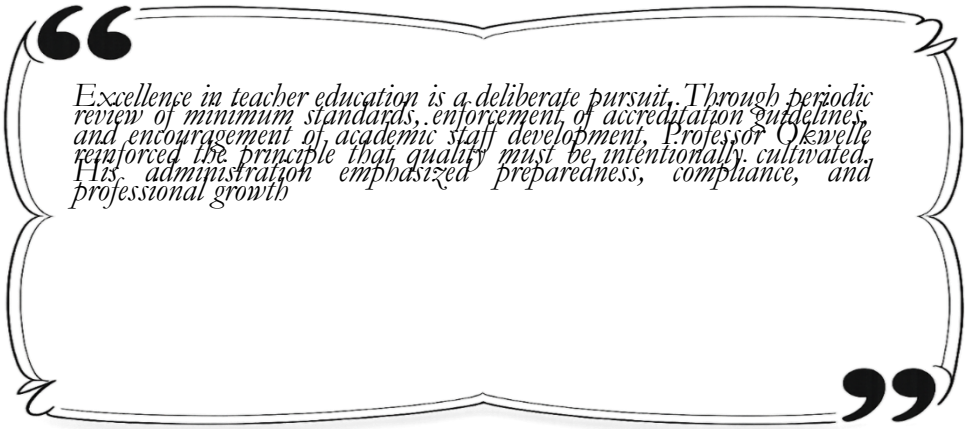
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Chapter 23

Integrating Artificial Intelligence into Social Studies Teacher Education Programmes: Implications for Pedagogy and Curriculum Design

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Abstract

The integration of Artificial Intelligence (AI) into Social Studies teacher education programmes represents a transformative approach to preparing educators for 21st-century classrooms. AI technologies, including intelligent tutoring systems, adaptive learning platforms, predictive analytics, and digital simulations, offer unprecedented opportunities to enhance pedagogical practices, curriculum design, and student engagement in Social Studies. However, challenges such as limited AI literacy among educators, inadequate infrastructure, ethical considerations, and resistance to technological adoption hinder effective implementation. This paper critically examines the implications of AI integration for Social Studies pedagogy and curriculum design, synthesizing theoretical frameworks, empirical findings, and practical applications. Recommendations are provided for policymakers, teacher educators, and institutions to facilitate responsible, innovative, and contextually relevant AI adoption.

Keywords: *Artificial Intelligence, Social Studies Education, Teacher Education, Digital Pedagogy, Curriculum Design, AI Literacy, Pedagogical Innovation*

Introduction

The educational landscape of the 21st century is undergoing profound transformation, driven largely by rapid advancements in digital technologies that have redefined how knowledge is produced, disseminated, accessed, and evaluated (Selwyn, 2016). Traditional teacher-centered instructional models are increasingly giving way to learner-centered, technology-mediated approaches that emphasize

flexibility, interactivity, and data-informed decision-making. Within this evolving context, educational systems across the globe are under growing pressure to align teaching and learning practices with the demands of the digital age, particularly in terms of critical thinking, problem-solving, civic competence, and lifelong learning.

Artificial Intelligence (AI) has emerged as one of the most disruptive and transformative technologies influencing contemporary education. Broadly defined as the capacity of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, pattern recognition, and decision-making, AI offers unprecedented possibilities for enhancing educational practice (Russell & Norvig, 2021). In educational settings, AI-driven tools facilitate the analysis of large-scale learner data, enable personalized and adaptive learning pathways, support predictive analytics for learner performance, automate assessment and feedback, and simulate complex social, economic, and political systems. These capabilities position AI as a powerful catalyst for pedagogical innovation and institutional reform.

Within the domain of Social Studies education, the integration of AI holds particular promise. Social Studies, by its interdisciplinary nature, seeks to develop informed, responsible, and critically engaged citizens who can interpret historical events, understand civic processes, appreciate cultural diversity, and respond thoughtfully to contemporary societal challenges. AI-enhanced instructional tools, such as intelligent tutoring systems, data visualization platforms, virtual simulations, and conversational agents, can deepen learners' engagement with abstract social concepts, facilitate inquiry-based learning, and promote higher-order thinking skills. For instance, AI-powered simulations can model electoral processes, conflict scenarios, or economic systems, enabling learners to explore cause-and-effect relationships and ethical dilemmas in safe, immersive environments. Such applications can significantly enrich civic literacy, historical consciousness, cultural awareness, and democratic participation.

Central to the successful integration of AI in Social Studies classrooms is the quality of teacher preparation. Social Studies teacher education programmes play a pivotal role in equipping both pre-service and in-service teachers with the competencies required to harness AI meaningfully and responsibly. Effective integration of AI extends beyond technical proficiency to encompass pedagogical content knowledge, curriculum design expertise, data literacy, and ethical awareness. Teachers must be able to critically evaluate AI tools, align them with curricular goals, adapt instructional strategies to diverse learners, and address concerns related to data privacy, algorithmic bias, and equity (Voogt et al., 2015). Consequently, AI integration in teacher education must be approached as a holistic pedagogical reform rather than a mere technological upgrade.

Despite its transformative potential, the adoption of AI in Social Studies teacher education faces numerous systemic and contextual challenges, particularly in developing and resource-constrained contexts. Inadequate digital infrastructure, limited access to reliable internet connectivity, insufficient funding, and low levels of AI literacy among teacher educators significantly constrain effective implementation. Additionally, policy gaps, weak institutional frameworks, and the absence of clear guidelines for ethical AI use further complicate integration efforts. Socio-cultural factors, such as resistance to change, fear of job displacement, and skepticism about technology-mediated learning, also shape teachers' attitudes and willingness to adopt AI-driven pedagogy.

Against this backdrop, there is an urgent need for empirical and conceptual inquiry into how AI can be effectively integrated into Social Studies teacher education programmes. Understanding the pedagogical, institutional, and policy dimensions of AI adoption is critical for developing sustainable models that enhance teacher preparedness and improve learning outcomes. By interrogating both the opportunities and challenges associated with AI integration, this study contributes to the growing discourse on technology-enhanced teacher education and provides insights for policymakers, curriculum developers, and teacher educators seeking to reimagine Social Studies education for the digital age.

Applications of Artificial Intelligence in Social Studies Teacher Education

The integration of Artificial Intelligence (AI) into Social Studies teacher education programmes provides transformative opportunities for enhancing pedagogical practice, curriculum delivery, assessment, and professional competence. AI-driven tools enable teacher trainees to move beyond passive consumption of content toward active engagement, reflective practice, and data-informed instructional decision-making. The following subsections highlight key applications of AI that are particularly relevant to the preparation of Social Studies educators.

1. Intelligent Tutoring Systems (ITS)

Intelligent Tutoring Systems (ITS) employ AI algorithms to deliver personalized instruction by adapting learning content, instructional strategies, and feedback to individual learners' prior knowledge, cognitive styles, and learning pace (VanLehn, 2011). Within Social Studies teacher education, ITS can serve dual functions: supporting the academic development of teacher trainees and modeling effective pedagogical practices. For example, ITS can simulate classroom scenarios related to civic education, historical inquiry, and geographical reasoning, enabling pre-service teachers to practice lesson sequencing, questioning techniques, and classroom management in risk-free, virtual environments.

Moreover, ITS can guide teacher trainees through complex pedagogical decisions, such as addressing controversial social issues, managing diverse viewpoints, and

fostering inclusive classroom discussions. By providing real-time feedback and scaffolding, ITS support reflective teaching practices and help trainees develop confidence and competence in applying learner-centered instructional strategies. This experiential approach enhances pedagogical content knowledge and bridges the gap between theory and practice in Social Studies education.

2. Adaptive Learning Platforms

Adaptive learning platforms utilize AI to continuously analyze learners' interactions, performance patterns, and engagement levels in order to deliver customized instructional content and feedback (Woolf, 2010). In Social Studies teacher education, these platforms can be used to train prospective teachers in designing differentiated instruction that accommodates learners' varying abilities, interests, and socio-cultural backgrounds. Through exposure to adaptive technologies, teacher trainees gain insight into how learning pathways can be personalised to support equity and inclusion in the Social Studies classroom.

Additionally, adaptive platforms can model best practices in curriculum alignment and formative assessment by demonstrating how instructional materials can be dynamically adjusted based on learner progress. Teacher trainees can experiment with modifying lesson content, assessment tasks, and instructional pacing, thereby developing practical skills in curriculum adaptation. Such experiences are particularly valuable in multicultural and heterogeneous learning environments, where Social Studies teachers must address diverse learning needs while maintaining curricular coherence.

3. AI-Driven Simulations and Virtual Learning Environments

AI-powered simulations and virtual environments offer immersive learning experiences that allow users to explore complex social, political, economic, and historical phenomena in interactive ways (Makransky & Petersen, 2019). In Social Studies teacher education, these tools can be used to model historical events, governance processes, conflict resolution scenarios, and policy-making dynamics. By engaging with simulations, teacher trainees can deepen their understanding of cause-and-effect relationships, multiple perspectives, and ethical considerations inherent in Social Studies content.

Training Social Studies educators to use AI-driven simulations enhances their capacity to foster critical thinking, empathy, and civic responsibility among learners. For instance, simulations of democratic elections, international diplomacy, or social justice movements enable students to assume different roles, make informed decisions, and reflect on the consequences of their actions. Such pedagogical approaches promote experiential learning and help future teachers design lessons that connect theoretical concepts to real-world social challenges.

4. Predictive Analytics for Assessment and Feedback

Predictive analytics, powered by AI, involves the analysis of large datasets to identify learning patterns, predict academic outcomes, and inform instructional interventions (Baker & Siemens, 2014). In Social Studies teacher education programmes, the integration of predictive analytics equips teacher trainees with data literacy skills essential for contemporary teaching practice. By analyzing student performance data, trainees can identify learning gaps, monitor progress, and implement timely, targeted instructional support.

Furthermore, predictive analytics supports the development of effective formative assessment strategies by enabling teachers to anticipate learners' difficulties and adjust instruction proactively. Teacher education programmes that incorporate these tools encourage evidence-based decision-making in curriculum planning, assessment design, and classroom instruction. This data-informed approach enhances instructional effectiveness and promotes accountability while maintaining a learner-centered focus.

5. AI-Powered Digital Content and Research Tools

AI-powered digital tools, including natural language processing systems, content recommendation engines, and automated summarization applications, facilitate access to vast and diverse educational resources (Zawacki-Richter et al., 2019). In Social Studies teacher education, these tools support teacher trainees in curating authentic, current, and contextually relevant instructional materials from multiple sources. Exposure to AI-driven research tools enhances trainees' ability to evaluate sources critically, synthesize information, and design inquiry-based learning activities.

Additionally, AI-supported content creation tools can assist teacher trainees in developing instructional materials, lesson plans, and assessment tasks aligned with curriculum standards and learning objectives. By integrating these technologies into their professional preparation, Social Studies educators can foster students' research, media, and information literacy skills, competencies that are increasingly vital in an era of misinformation, digital media saturation, and complex global challenges.

Challenges of Artificial Intelligence Integration in Social Studies Teacher Education

Despite the transformative potential of Artificial Intelligence (AI) in enhancing Social Studies teacher education, its effective integration remains fraught with multiple interrelated challenges. These challenges span technical, pedagogical, institutional, ethical, and socio-cultural dimensions and are particularly pronounced in developing and resource-constrained educational contexts. Addressing these

barriers is essential for ensuring that AI adoption in teacher education is meaningful, equitable, and sustainable.

1. Limited AI Literacy and Pedagogical Competence

A major obstacle to the integration of AI in Social Studies teacher education is the limited level of AI literacy and pedagogical competence among both pre-service and in-service teachers. Many teacher trainees possess only basic digital skills and lack a deeper understanding of how AI systems function, how data are generated and analyzed, and how AI tools can be pedagogically aligned with Social Studies learning objectives (Voogt et al., 2015). These skills gap often results in the superficial use of AI technologies, where tools are adopted for their novelty rather than their instructional value.

Furthermore, teacher educators themselves may lack the expertise required to model effective AI-driven teaching practices, thereby limiting opportunities for meaningful professional socialization. Without structured training, continuous professional development, and curriculum integration, teachers may struggle to critically evaluate AI tools, adapt them to diverse classroom contexts, and address ethical implications. Consequently, the absence of comprehensive AI competency frameworks within teacher education programmes undermines the potential of AI to transform Social Studies pedagogy.

2. Infrastructural Deficits

Infrastructural inadequacies remain a significant barrier to AI integration in Social Studies teacher education, particularly in rural, underserved, and economically disadvantaged regions. Limited access to reliable electricity, high-speed internet connectivity, up-to-date computing devices, and AI-enabled platforms constrains the practical use of advanced digital tools (Nyenwe & Ishikaku, 2021). Even when institutions possess basic ICT infrastructure, the lack of maintenance, technical support, and system upgrades often renders AI applications ineffective or unsustainable.

These infrastructural challenges exacerbate existing educational inequalities, as teacher trainees in poorly resourced institutions are denied opportunities to develop digital and AI-related competencies. As a result, disparities in teacher preparedness persist, undermining national and global efforts to promote equitable access to quality education. Addressing infrastructural deficits requires coordinated investments, public–private partnerships, and policy interventions that prioritize digital inclusion within teacher education systems.

3. Ethical and Privacy Concerns

The deployment of AI in education raises profound ethical and privacy concerns that pose challenges to its adoption in Social Studies teacher education. AI systems often rely on large volumes of learner data, raising questions about data ownership, consent, surveillance, and confidentiality. Issues such as algorithmic bias, lack of transparency in decision-making processes, and the potential misuse of predictive analytics in student assessment further complicate ethical considerations (UNESCO, 2021).

Teacher education programmes are frequently ill-equipped to address these concerns systematically, resulting in limited awareness among teacher trainees of ethical AI practices. Without explicit training in digital ethics, data protection regulations, and responsible AI use, educators may inadvertently perpetuate inequities or violate learners' rights. Given that Social Studies emphasizes citizenship, democracy, and social justice, failure to address ethical AI use undermines the very values the discipline seeks to promote.

4. Resistance to Change and Technological Adoption

Resistance to change constitutes a significant socio-cultural barrier to AI integration in Social Studies teacher education. Deeply entrenched traditional teaching practices, coupled with skepticism toward technology-mediated instruction, often inhibit teachers' willingness to adopt AI tools (Rogers, 2003). Some educators perceive AI as a threat to professional autonomy, job security, or established pedagogical identities, leading to reluctance or outright resistance.

Additionally, negative prior experiences with poorly implemented educational technologies can reinforce distrust and reduce motivation to experiment with AI-driven innovations. Overcoming such resistance requires strategic change management approaches, including capacity-building initiatives, peer mentoring, and the demonstration of tangible classroom benefits. Creating supportive institutional cultures that value innovation, experimentation, and reflective practice is essential for fostering positive attitudes toward AI adoption.

5. Cost and Sustainability Constraints

The financial implications of AI integration present another major challenge for Social Studies teacher education programmes, particularly in developing contexts. Implementing AI technologies often entails high initial investments in infrastructure, software licensing, system customization, and staff training. Beyond these startup costs, ongoing expenses related to maintenance, technical support, data storage, and system upgrades pose significant sustainability concerns.

Many teacher education institutions operate under constrained budgets and competing priorities, making long-term investment in AI difficult. Without sustainable funding models and clear cost–benefit analyses, AI initiatives risk becoming short-lived pilot projects rather than institutionalized practices. Ensuring sustainability requires strategic planning, government support, and scalable solutions that align with institutional capacities and national education goals.

Implications for Pedagogy and Curriculum Design

The integration of Artificial Intelligence (AI) into Social Studies teacher education carries far-reaching implications for pedagogical practice and curriculum design. Beyond the introduction of new technological tools, AI necessitates a fundamental rethinking of how Social Studies is taught, how learning is assessed, and how teachers are prepared to navigate complex, data-driven educational environments. Effective AI integration therefore requires pedagogical innovation, curriculum flexibility, and ethical consciousness.

1. Pedagogical Innovation and Learner-Centered Instruction

AI integration encourages a shift from traditional, teacher-dominated instructional models to learner-centered pedagogies that prioritize active engagement, critical inquiry, and authentic learning experiences. Through AI-enabled tools such as intelligent tutoring systems, adaptive learning platforms, and interactive simulations, Social Studies teachers can implement differentiated instruction that responds to learners' individual needs, interests, and abilities. These technologies support inquiry-based learning, project-based learning, and problem-solving approaches by enabling students to explore real-world social issues, analyze diverse perspectives, and construct evidence-based arguments.

Furthermore, AI-enhanced pedagogy promotes the development of higher-order cognitive skills, including critical thinking, analytical reasoning, and civic judgment. By simulating real-life civic processes, policy debates, and socio-political scenarios, AI tools enable learners to engage meaningfully with complex societal challenges. For Social Studies teacher education, this implies preparing teachers to design interactive lessons that not only convey content knowledge but also cultivate democratic values, civic competence, and social responsibility.

2. Data-Driven Curriculum Development and Instructional Design

The use of AI-powered predictive analytics and learning data introduces new possibilities for data-driven curriculum development in Social Studies teacher education. By analyzing learners' performance patterns, engagement levels, and competency acquisition, teacher educators can design curricula that are responsive to learners' needs and aligned with contemporary educational demands (Baker &

Siemens, 2014). AI-informed curriculum design enables continuous monitoring and refinement of course content, instructional strategies, and assessment practices.

This data-driven approach supports the identification of learning gaps, emerging trends, and evolving competency requirements, ensuring that Social Studies curricula remain relevant and future-oriented. Additionally, AI tools facilitate competency-based education by enabling the tracking of skills such as critical thinking, civic literacy, digital competence, and ethical reasoning. As a result, curriculum design becomes more adaptive, evidence-based, and learner-responsive, moving beyond static syllabi toward dynamic learning frameworks.

3. Integration of Ethical Awareness and Digital Literacy

The growing reliance on AI in education underscores the need to embed ethical awareness and digital literacy within Social Studies teacher education curricula. Teacher trainees must be equipped with the knowledge and skills required to use AI tools responsibly, critically, and ethically. This includes understanding issues related to data privacy, algorithmic bias, transparency, and accountability, as well as the broader social implications of AI adoption in educational contexts (Hodges et al., 2020).

Integrating ethical AI use into the curriculum aligns closely with the core objectives of Social Studies, which emphasize citizenship education, democratic participation, and social justice. By incorporating modules on digital ethics, information literacy, and responsible decision-making, teacher education programmes can prepare educators to guide learners in navigating technology-mediated environments thoughtfully. Such preparation ensures that AI integration reinforces, rather than undermines, the civic and moral foundations of Social Studies education.

4. Promotion of Collaborative and Global Learning

AI technologies significantly enhance opportunities for collaborative and global learning within Social Studies education. Through AI-enabled communication platforms, virtual exchanges, and collaborative learning environments, teachers and students can engage with peers across geographical and cultural boundaries. These tools facilitate cross-cultural dialogue, joint problem-solving, and the exploration of global social phenomena, thereby fostering intercultural understanding and global citizenship (Selwyn, 2016).

Moreover, AI-driven simulations and virtual reality environments enable learners to examine global issues such as climate change, migration, conflict, and governance from multiple perspectives. Social Studies teacher education programmes that emphasize collaborative and global learning prepare teachers to cultivate participatory skills, empathy, and global awareness among students. Such

pedagogical approaches align with the broader goals of education for sustainable development and democratic engagement in an interconnected world.

Recommendations

In light of the pedagogical and curricular implications of Artificial Intelligence (AI) integration in Social Studies teacher education, the following recommendations are proposed to guide policy formulation, institutional practice, and future research. These recommendations emphasize sustainability, equity, ethical responsibility, and contextual relevance, particularly within developing and transitional educational systems.

1. Systematic Integration of AI Competencies into Teacher Education Curricula

AI competencies should be systematically embedded within both pre-service and in-service Social Studies teacher education curricula rather than treated as optional or peripheral content. This integration should encompass foundational AI literacy, pedagogical applications of AI, data-informed instructional practices, and ethical considerations. Curriculum frameworks should align AI-related learning outcomes with Social Studies goals such as civic education, critical thinking, historical reasoning, and cultural understanding. By embedding AI competencies across courses and practicum experiences, teacher education programmes can ensure coherent, progressive, and sustained skill development that prepares educators for technology-enhanced teaching environments.

2. Strategic Investment in Digital Infrastructure and Learning Technologies

Governments and educational institutions must prioritize strategic investment in digital infrastructure to support effective AI integration. This includes the provision of reliable high-speed internet connectivity, modern computing devices, AI-enabled software, and secure virtual learning environments. Attention should also be given to technical support systems, maintenance, and regular upgrades to ensure long-term functionality and accessibility. Such investments are particularly critical for rural and under-resourced institutions, where infrastructural deficits exacerbate educational inequalities. Addressing these gaps will promote equitable access to AI-enhanced teacher education and reduce disparities in teacher preparedness.

3. Continuous Professional Development and Capacity Building

Sustained professional development programmes are essential for enhancing teachers' AI literacy, pedagogical competence, and ethical awareness. These programmes should move beyond one-off workshops to include ongoing training, mentoring, peer learning communities, and reflective practice opportunities.

Professional development initiatives should equip teacher educators and classroom teachers with the skills to evaluate AI tools critically, integrate them meaningfully into Social Studies instruction, and adapt them to diverse learning contexts. Emphasis should also be placed on developing teachers' confidence and agency in using AI as a pedagogical support rather than a replacement for professional judgment.

4. Participatory and Inclusive Design of AI Tools and Practices

The design, evaluation, and implementation of AI tools in Social Studies education should adopt participatory and inclusive approaches that actively involve teachers, learners, curriculum developers, and other stakeholders. Engaging end users in the development process ensures that AI technologies are pedagogically relevant, culturally responsive, and aligned with classroom realities. Inclusive participation also enhances ownership, reduces resistance to change, and promotes more effective adoption. Furthermore, such collaborative approaches can help identify potential biases, contextual constraints, and ethical risks early in the implementation process.

5. Development of Robust Ethical and Regulatory Frameworks

Clear and enforceable policies and regulatory frameworks are necessary to guide the ethical, equitable, and transparent use of AI in Social Studies teacher education. Policymakers should establish guidelines addressing data privacy, algorithmic accountability, fairness, and inclusivity, in line with international best practices and local legal contexts. Teacher education curricula should incorporate these ethical frameworks to ensure that educators are equipped to make responsible decisions regarding AI use. Given the civic and moral orientation of Social Studies, ethical AI practices should be framed as integral to democratic values and social justice.

6. Promotion of Research, Innovation, and Evidence-Based Practice

There is a need for sustained research and innovation focusing on AI applications in Social Studies pedagogy and teacher education. Empirical studies should examine the effectiveness of AI-driven instructional strategies, assessment tools, and professional development models across diverse educational contexts. Research efforts should also explore teachers' perceptions, learners' experiences, and the long-term impacts of AI integration on teaching quality and learning outcomes. Generating context-sensitive evidence will inform policy decisions, curriculum reforms, and the development of scalable best practices.

7. Strengthening Multi-Stakeholder Collaboration and Partnerships

Effective and sustainable AI integration requires strong collaboration among governments, teacher education institutions, researchers, technology providers, and civil society organizations. Multi-stakeholder partnerships can facilitate resource

sharing, technical support, policy alignment, and innovation. Public–private partnerships, in particular, can support infrastructure development, capacity building, and localised AI solutions tailored to educational needs. Such collaborative efforts enhance sustainability, scalability, and alignment with national education goals and global development agendas.

Conclusion

Artificial Intelligence (AI) holds significant transformative potential for Social Studies teacher education, particularly in its capacity to enhance pedagogical practice, curriculum design, assessment processes, and learner engagement. As education systems increasingly respond to the demands of a digital and data-driven society, the integration of AI offers innovative pathways for reimagining how Social Studies is taught and how teachers are prepared for contemporary classrooms. Through intelligent tutoring systems, adaptive learning platforms, simulations, and predictive analytics, AI enables more personalized, interactive, and inquiry-oriented learning experiences that align with the core objectives of Social Studies education.

Integrating AI into Social Studies teacher education equips teachers with essential technological, pedagogical, and ethical competencies required for effective 21st-century instruction. Beyond technical proficiency, AI-supported teacher preparation fosters critical thinking, reflective practice, and evidence-based decision-making, while empowering educators to design learner-centered and inclusive instructional strategies. For learners, AI-enhanced Social Studies instruction promotes civic literacy, democratic engagement, cultural understanding, and global awareness—competencies that are vital in addressing complex societal challenges in an interconnected world.

Nevertheless, the successful adoption of AI in Social Studies teacher education is not without challenges. Persistent issues such as limited AI literacy, inadequate digital infrastructure, ethical and privacy concerns, resistance to change, and sustainability constraints continue to impede effective implementation, particularly in developing and resource-constrained contexts. Addressing these challenges requires coordinated and strategic efforts, including supportive policy frameworks, sustained professional development, targeted infrastructural investments, and robust ethical guidelines that prioritize equity, transparency, and accountability.

Ultimately, the meaningful integration of AI positions Social Studies educators to deliver innovative, data-informed, and learner-centered instruction that is responsive to evolving educational realities. When embedded thoughtfully within teacher education programmes, AI serves not as a replacement for pedagogical expertise but as a powerful tool that enhances teachers' professional capacity and enriches learning experiences. By aligning technological innovation with pedagogical purpose and

ethical responsibility, Social Studies teacher education can remain relevant, resilient, and transformative in the digital era.

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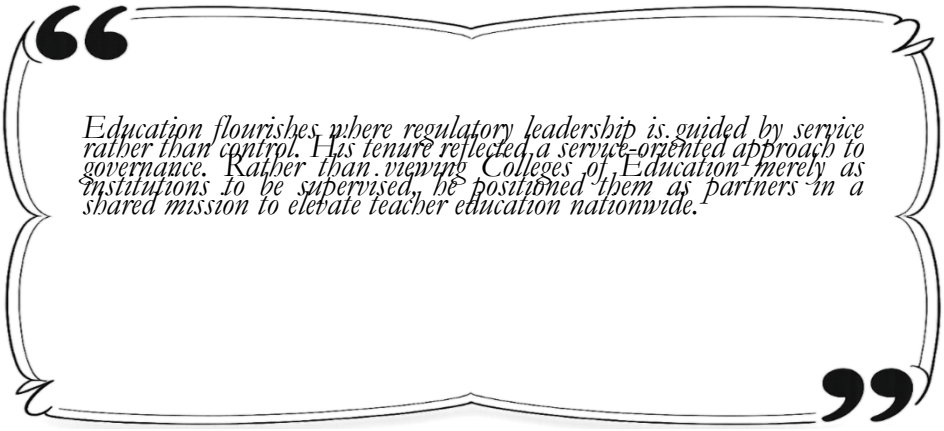
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Chapter 24

Strengthening Quality Assurance Strategies and Academic Standards in Nigeria Universities

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Abstract

Quality Assurance is increasingly recognised not merely as an administrative requirement, but as a critical mechanism for improving institutional effectiveness, teaching quality, and national development. This paper examines Quality Assurance within Nigeria's education system, with particular emphasis on higher education. It discusses practical strategies for strengthening educational quality and explains how effective Quality Assurance practices contribute to improved academic standards in universities. The paper also identifies key challenges confronting Quality Assurance implementation, including inadequate funding, weak infrastructure, limited staff development, and inconsistent policy enforcement. Furthermore, it explores approaches for sustaining quality in Nigerian universities and reviews policy frameworks designed to enhance Quality Assurance processes. The study emphasizes that Quality Assurance should be understood as a continuous and systematic process rather than a one-time accreditation exercise. Regular monitoring, feedback, and evaluation are presented as essential tools for institutional improvement. The paper recommends increased government commitment and adequate funding to support accreditation activities, staff training, and capacity building. It concludes that quality education is essential for

ational competitiveness, social mobility, human capital development, and long-term economic growth in Nigeria and sustainable prosperity

Keywords: *Quality assurance, academic standards, university education, educational quality, Nigeria*

Introduction

Quality is the level of excellence in a field of practice. Quality relates to a standard which can be used to measure either a level of achievement or an output. It is an ideal measure of performance which one can never fully attain but which one strives to achieve. It is a revolving ideal that should be kept active, relevant and poised in order to add value to the teaching and learning process. Quality as a concept is inherently multi-dimensional, and as such, it has been defined in various ways by different scholars within the educational sector. According to Okoro (2015), quality refers to how well a product, service, or system meets agreed standards set by laws, institutions, or professional bodies. In education, this means that quality is shown by how closely teaching, learning, and outcomes follow these established standards. When an educational process or result meets these standards, it is considered better than others. This shows that educational quality is not based on personal opinion but on clear and recognized standards that guide how institutions operate, how teachers teach, and how students learn .In this context, quality assurance (QA) has emerged as a model for ensuring that higher education meets societal expectations. Quality assurance provides structured and systematic mechanisms for the continuous monitoring, evaluation, and enhancement of teaching, learning, research, and institutional operations. In the absence of effective quality assurance systems, higher education risks falling below international standards, producing graduates who are insufficiently prepared for professional and societal demands, and making limited contributions to national development.

Amahua (2010) advances a holistic conception of quality assurance by presenting educational quality as an integrated system in which multiple dimensions must be coherently aligned to achieve and sustain academic standards. These dimensions include learners who are healthy, adequately supported, and prepared for advanced learning; institutional environments that are safe, inclusive, gender-sensitive, and equipped with appropriate facilities; curricula and content that promote relevant disciplinary knowledge, critical thinking, and essential life skills; and teaching and learning processes that are student-centred, delivered by qualified academic staff, and supported by effective assessment practices. Furthermore, quality assurance emphasizes educational outcomes that reflect meaningful knowledge, skills, values, and attitudes consistent with national and global development priorities.

Adegbesan (2011) identifies four key dimensions through which the quality of university programmes can be assessed which are: input quality, process quality, contextual quality, and output quality. Achieving educational quality therefore requires that all elements involved in the teaching learning process including personnel, facilities, instructional materials, and governance structures are available in adequate quantity and are of appropriate quality to support intended learning outcomes. (Okoye, 2018) Opinions that when these components function in a coordinated and complementary manner, educational institutions are better able to sustain a focus on development, monitor the school climate, enhance learner well-being, promote effective teaching and learning, and assess the impact of educational innovations.

In Nigeria, the Federal Ministry of Education (FME, 2014) conceptualizes quality assurance as a significant departure from the traditional model of routine school inspection toward a more comprehensive, systematic, and standards-driven process of monitoring and evaluation. This reconceptualization reflects a growing recognition that periodic inspections alone are insufficient for ensuring and sustaining quality in an increasingly complex educational system. Instead, quality assurance is framed as a continuous and integrative mechanism aimed at improving teaching, learning, and institutional performance across all levels of education. Under this framework, quality assurance extends beyond compliance checks to encompass the systematic evaluation of educational inputs, processes, and outputs. Educational inputs include human resources such as qualified teachers and administrators, physical infrastructure, instructional materials, and financial resources.

The FME's approach emphasizes continuous improvement rather than fault-finding, positioning quality assurance as a developmental tool that supports institutions in identifying gaps, implementing corrective measures, and enhancing academic standards. Through regular monitoring, data-driven evaluation, and adherence to nationally defined benchmarks, institutions are encouraged to maintain accountability, transparency, and consistency in educational delivery. This approach also aligns with global best practices, which stress the importance of internal quality assurance systems complemented by external oversight mechanisms.

Anioke (2013) conceptualizes quality assurance as a process anchored on three interrelated principles which are: control, accountability, and improvement. The principle of control focuses on the efficient and strategic deployment of resources to achieve educational goals. This includes the management of financial allocations, human capital, infrastructure, and instructional materials to ensure optimal utilization and minimal waste. In higher education, control factors are reflected in regulatory compliance, internal audits, accreditation requirements, and performance benchmarks that guide universities in maintaining consistency and quality across

academic programmes. Effective control ensures that universities operate within defined standards while aligning their resources with national education priorities and institutional missions. Accountability, as the second principle, underscores the responsibility of higher education institutions to meet the expectations of diverse stakeholders, including students, parents, employers, government agencies, professional bodies, and society at large.

This principle emphasizes transparency in governance, curriculum relevance, assessment practices, and graduate outcomes. Through accountability frameworks, institutions are expected to demonstrate that their academic offerings are credible, relevant, and responsive to labour market demands and national development objectives. Accountability also strengthens public trust and legitimizes institutional autonomy by ensuring that universities and colleges remain answerable for their performance and impact. The third principle, improvement, highlights the continuous and systematic enhancement of educational processes and outcomes. Rather than viewing quality assurance as a static or punitive exercise, Agih (2015) positions it as a developmental tool aimed at refining teaching methodologies, assessment strategies, curriculum design, and student support services. Continuous improvement fosters innovation, adaptability, and excellence, enabling institutions to respond effectively to emerging knowledge demands and societal challenges.

In the early years of Nigeria's educational development, the university was widely regarded as the most important institution for the production of high-level manpower and the apex of the entire educational system. Universities were seen as critical drivers of national development and intellectual advancement. According to Agih (2015), university education is designed to raise the intellectual tone of society, cultivate the public mind, purify national taste, supply principles that guide popular aspirations, and provide balance and maturity to the ideas of the age. Given this vital role, it is not surprising that stakeholders in university education have traditionally guarded the integrity of the university system and the quality of graduates it produces. Historical evidence indicates that Nigerian universities once produced graduates of high quality. Daisi (2017) affirmed that many graduates of Nigerian universities distinguished themselves in their various fields of specialization, with several attaining professorial positions in leading universities across the world. This achievement suggests that quality entrances were effectively transformed into quality graduates. However, in recent years, concerns about declining academic standards have become widespread, and the prestige once associated with Nigerian universities appears to have diminished. This decline is evident in persistent criticisms surrounding admission procedures and the perceived quality of graduates produced.

At the first Education Summit of Oyo State held in Ibadan, Okebukola (2006) expressed serious concerns about the quality of graduates produced by Nigerian universities, particularly within the preceding four years. He further projected a

continued decline in the quality of graduates over the next three years if corrective measures were not implemented. Similarly, Adebayo (2007) described as unsatisfactory the absence of Nigerian universities from the world's top 500 universities. More troubling was Nigeria's ranking as 44th in Africa, behind countries such as Ghana, Kenya, and South Africa. Several studies by (Nwokocha, 1997; Ige, 1997; Jemibewon, 1997) have attributed the decline in quality partly to the poor academic preparedness of students admitted into Nigerian universities. Nwokocha (1997) drew attention to a purported letter from the British Council warning British universities that Nigerian degrees were no longer comparable to UK honours degrees, regardless of the awarding institution or discipline. In a similar vein, Ige (1997) reported encountering undergraduate examination scripts that reflected extremely poor academic performance, which he described as deplorable.

Further evidence of declining quality is found in the National Universities Commission (NUC, 2004) assessment of labour market expectations. The study revealed a high rate of graduate unemployment, while many employed graduates required remedial training to address significant gaps in knowledge and skills acquired during their university education. This situation contradicts the fundamental purpose of university education, which is to produce a competent workforce capable of contributing meaningfully to national development. Nigeria has also opened its higher education system to foreign academic programmes, leading to the commercialization of education. While such collaborations have offered certain benefits, they have also introduced challenges, including the delivery of substandard programmes, inadequate monitoring by partner institutions, inconsistent quality standards, and limited alignment with national needs and policies. Additional challenges include issues of comparability of qualifications, cultural differences, and the recognition of foreign credentials. Technology-mediated education, fraudulent qualifications, and academic malpractice have further complicated quality assurance efforts.

Recent developments suggest that quality assurance in Nigerian universities has significantly weakened. This is particularly concerning given Nigeria's former status as a hub of university education in the West African sub-region. Factors contributing to this decline include the collapse of essential infrastructure, rapid expansion in student enrolment without proportional increases in funding, and inadequate institutional capacity. Nigerian universities have increasingly struggled to meet expectations in teaching and research due largely to inadequate funding. Kayode (2002) observed that insufficient funding has created a vicious cycle of helplessness, frustration, and declining standards. Babalola (2001) similarly reported that Nigerian universities are in crisis, characterized by limited resources for teaching, research, and community service. University libraries are poorly stocked, laboratories lack essential equipment, classrooms are dilapidated, and office accommodations are

inadequate. In addition, many universities suffer from shortages of qualified academic staff.

Several key factors continue to undermine quality assurance in Nigerian universities. One major challenge is underfunding. The establishment and operation of universities are capital-intensive, requiring sustained investment in infrastructure, staff salaries, learning facilities, and student accommodation. Economic challenges have significantly reduced government funding, resulting in overcrowded classrooms, deteriorating facilities, frequent strikes, and student unrest. Another major issue is enrollment explosion. Excess student enrolment has overstretched available facilities and compromised teaching effectiveness. Okebukola (2005) highlighted instances of extreme overcrowding, noting that Olabisi Onabanjo University, Ago-Iwoye, exceeded its carrying capacity by over 24,000 students. Such conditions inevitably lead to poor learning outcomes and increased examination malpractice.

Inadequate physical facilities further compound the problem. According to the NUC (2006), facilities in many Nigerian universities are poorly maintained and severely overstretched, making it difficult to guarantee educational quality. Poor university management also plays a significant role. In many cases, administrators function merely as caretakers rather than visionary leaders, focusing on maintaining the status quo rather than driving innovation and reform. Staffing inadequacies remain another critical challenge. The NUC (2006) reported that only 16,856 out of 72,704 staff in federal universities were academic staff, indicating a severe imbalance. Many universities are bottom-heavy, with insufficient qualified lecturers to meet teaching and research demands. To ensure sustainable university education, several quality control measures must be implemented. Effective leadership is essential. University administrators, particularly vice-chancellors, must possess strong administrative competence, integrity, and visionary leadership skills. They must adopt modern management styles and ensure efficient utilization of both human and material resources to achieve institutional goals.

Internal quality assurance mechanisms are also vital. These include strict control of student admissions, programme development, and evaluation processes. The Joint Admissions and Matriculation Board (JAMB), alongside post-UTME screening exercises, plays a crucial role in ensuring that only academically qualified candidates gain admission. Teaching and learning quality must be strengthened, as teachers are central to educational quality (NCCE, 2002). Academic staff must be competent, committed, and capable of mentoring students academically and morally. Supervision and inspection further support quality assurance by ensuring adherence to educational policies, promoting effective teaching, and identifying performance gaps. Monitoring and evaluation are equally important. Continuous assessment of institutional activities, coupled with timely feedback, helps sustain high standards.

As the external quality assurance body, the NUC plays a critical role through accreditation, funding allocation, establishment of minimum academic standards, and programme monitoring. Policy measures for strengthening quality assurance include curriculum reform to ensure responsiveness to learners' needs and societal demands. Strategic planning, environmental scanning (SWOT analysis), gap analysis, implementation, and monitoring are essential components of a sustainable quality assurance framework.

Historical Development of Quality Assurance in Nigerian Universities

In the earliest years of university education in Nigeria, quality was mainly upheld through academic traditions and internal university practices rather than through formal national systems. The University of Ibadan established in 1948 as the first university in Nigeria was initially affiliated with the University of London and inherited the British model of academic quality maintenance. This meant that curriculum, examinations, and academic standards were guided by well-established external examiners and university norms, which ensured a high level of academic credibility. During this period, university education was limited and closely supervised by the originating institutions abroad. After Nigeria gained independence in 1960, there was rapid growth in the establishment of universities across the country. The federal and regional governments founded additional universities in the 1960s and 1970s to meet the growing demand for higher education. However, this expansion led to variations in academic programme quality and raised concerns about how academic standards could be maintained uniformly across different institutions. Without centralized oversight, universities developed their own curricula, student assessment patterns, and graduation criteria, which made academic quality inconsistent across the system.

In recognition of these challenges, the Nigerian government took a major step by establishing the National Universities Commission (NUC) in 1974 as a statutory body with responsibility for coordinating and monitoring university education in the country. The Commission's mandate was to advise the government on university planning, funding, and development and to ensure the orderly growth of the university system. Over time, its role expanded to include oversight of academic standards and quality assurance across all universities in Nigeria including federal, state, and eventually private institutions. By the late 1980s, concerns about declining quality due to inadequate facilities, shortages of qualified academic staff, and expanding student populations became more pressing. The NUC responded by introducing accreditation exercises and formal evaluations of academic programmes to determine whether they met stipulated quality requirements in terms of curriculum content, staffing, infrastructure, and learning resources. Accreditation became a key tool in ensuring that universities complied with prescribed academic standards, with

programmes falling into full, interim, or denied accreditation status depending on the extent to which they met set criteria.

A critical milestone in the development of quality assurance came with the creation of Minimum Academic Standards (MAS) in 1989, which were later reviewed and rebranded as Benchmark Minimum Academic Standards (BMAS) in the early 2000s. The MAS/BMAS framework provides detailed prescriptions on curriculum structure, course content, credit requirements, and expected learning outcomes for academic programmes offered across Nigerian universities. The aim of BMAS was to promote consistency in academic offerings and ensure that graduates across different universities possess comparable levels of knowledge and competence. This framework also served to align Nigerian university programmes with international benchmarks while allowing institutions some flexibility to innovate. Alongside external evaluations, universities were encouraged to develop internal quality assurance systems to institutionalize quality maintenance within their operations. These internal mechanisms include periodic curriculum review, moderation of examination questions, academic staff appraisal systems, and departmental quality audits. Many universities established dedicated Quality Assurance Units or similar administrative bodies to coordinate internal quality checks and align internal practices with national standards.

The emergence of private universities from the late 1990s and early 2000s further strengthened the quality assurance framework in Nigeria. Private institutions had to meet the same accreditation requirements as public universities before they could be licensed to operate. The NUC's rigorous programme approval and accreditation process for private universities helped to safeguard academic standards and assure stakeholders such as students, parents, and employers that these institutions deliver credible and quality education. Over the past decade, Nigerian quality assurance practices have increasingly aligned with global trends in higher education quality. The NUC has pursued international collaborations and partnerships with regional and international quality assurance bodies to improve local practices and adopt best global standards. For example, agreements between NUC and organizations like CAMES reflect efforts to harmonize quality assurance across African higher education systems and promote mutual recognition of qualifications. Today, quality assurance in Nigerian universities is seen not merely as regulatory compliance but as a continuous process aimed at improving academic standards, institutional performance, and relevance to national development needs. Despite ongoing challenges such as inadequate funding, staff shortages, and infrastructural limitations, the historical evolution of quality assurance demonstrates a persistent effort by policymakers, regulators, and institutions to ensure that Nigerian universities uphold academic integrity and produce graduates who are competent and competitive both nationally and internationally.

Strengthening Quality in Nigeria's Education System

Strengthening quality in Nigeria's education system requires a deliberate, coordinated, and sustainable approach that addresses both structural and instructional challenges. Educational quality does not emerge by chance; rather, it is the result of continuous and well-planned efforts aimed at improving inputs, processes, and outcomes. Asiyai 2015, agrees that quality assurance in education is not a one-time activity but an ongoing cycle of planning, implementation, monitoring, evaluation, and improvement. In Nigeria, where issues such as inadequate funding, overcrowded classrooms, obsolete curricula, limited facilities, and weak administrative practices persist, building sustainable quality demands the consistent application of effective management and quality assurance strategies.

Planning is the foundation upon which all other quality assurance activities depend. Effective educational planning allows institutions to clearly define goals, anticipate future needs, allocate resources efficiently, and set measurable standards for performance. Obadara and Alaka (2013) emphasize that proper planning enables educational managers to align available resources with institutional objectives and national education policies. Without sound planning, schools often struggle with poor resource management, staff shortages, ineffective programme implementation, and inadequate learning materials. Strategic planning also ensures that educational policies and practices respond to local realities while remaining consistent with global trends in education.

Closely linked to planning are monitoring and evaluation mechanisms, which play a critical role in maintaining accountability and promoting continuous improvement. Adegbesan (2011) describes monitoring and evaluation as processes that enable institutions to track progress, assess performance, and identify gaps in implementation. In practical terms, these processes involve supervising instructional activities, evaluating teacher effectiveness, assessing student learning outcomes, and reviewing curriculum delivery. When monitoring and evaluation are conducted regularly and objectively, they provide valuable feedback for decision-making, reduce wastage of resources, and support timely corrective actions.

Quality control is another important component of strengthening educational quality. Folami and Musolihu (2021) note that quality control ensures that educational institutions meet minimum standards in areas such as curriculum implementation, instructional delivery, infrastructure, staffing, and assessment practices. In a developing country like Nigeria, where education is expected to drive economic growth and social development, quality control helps to protect the credibility of certificates awarded by schools and institutions. It also promotes public confidence in the education system and ensures that graduates possess skills and knowledge that are relevant at both national and international levels.

Supervision also plays a significant role in improving educational quality. Scholars such as Ewuzie (2011), Agih (2015), and Mogbeyiteren (2019) view supervision not as fault-finding or policing but as a supportive process aimed at improving teaching and learning. Effective supervision provides opportunities for mentoring teachers, improving instructional methods, encouraging professional development, and ensuring the proper use of teaching materials. Through constructive supervision, teachers become more motivated, teaching practices improve, and students benefit from better learning experiences.

In addition, the learning environment is a key determinant of educational quality. Giami (2019) explains that while learning can occur in informal settings, formal education requires environments that are safe, supportive, and adequately equipped. This includes sufficient classroom space, functional furniture, textbooks, laboratories, libraries, ICT facilities, clean water, and proper sanitation. Garba (2014) further observes that a conducive learning environment improves student concentration, reduces distractions, and enhances the relationship between teaching efforts and learning outcomes.

Taken together, planning, monitoring and evaluation, quality control, supervision, and a conducive learning environment form the core elements of an effective quality assurance system. Strengthening Nigeria's education system therefore requires the consistent and coordinated application of these strategies across all levels of education basic, secondary, and tertiary. When properly implemented, these measures improve academic standards, support teachers, enhance student learning, and contribute meaningfully to national development. Ultimately, embedding quality into Nigeria's education system is essential for preparing future generations with the knowledge, skills, values, and competencies needed to thrive in an increasingly complex and competitive global environment.

The Role of Quality Assurance in Enhancing Higher Education Standards

Quality assurance (QA) plays a central role in maintaining and improving standards in higher education. According to Adegbesan (2011), QA functions as a vital mechanism for controlling quality, ensuring that high standards are maintained across all levels of education, strengthening monitoring and supervision, assessing teacher adequacy, guiding classroom requirements based on class-size norms, evaluating facilities, and promoting the prudent use of financial and material resources. When these functions are effectively implemented, they enhance the sustainability of the education system and equip learners with the knowledge, skills, and values needed for active societal participation and national development.

One of the primary contributions of QA is the promotion of institutional accountability. Higher education institutions today are under increasing scrutiny from governments, regulatory bodies, employers, and the broader society. QA

frameworks provide structured mechanisms for demonstrating that institutional resources are being effectively managed and that educational programmes meet regulatory and professional standards. Garba (2014) observes that establishing robust QA structures enhances transparency, builds public confidence, and strengthens the credibility of certificates awarded by institutions. Iniobong (2012) further emphasizes that accountability mechanisms are essential for maintaining public trust and ensuring that institutions fulfill their educational mandates. By embedding accountability within institutional processes, QA ensures that higher education institutions operate efficiently and responsibly.

Another significant role of QA is ensuring the relevance of academic programmes. In an era marked by rapid technological change and evolving labour market needs, it is crucial for higher education institutions to align curricula with societal and economic demands. Asiyai (2015) notes that continuous curriculum review through QA processes equips students with skills that are applicable in real-life contexts, thereby improving employability and institutional relevance. Njoku (2016) similarly emphasizes that quality-oriented higher education systems are critical for knowledge-based societies, as they support innovation, technological advancement, and economic growth. By ensuring programme relevance, Quality assurance helps institutions produce graduates who can contribute meaningfully to national development and adapt to global trends.

Quality assurance also strengthens teaching and learning processes. Effective QA systems encourage academic staff to adopt reflective practices, embrace innovative pedagogical methods, and improve assessment strategies. Nnorom (2013) highlights that systematic evaluation of teaching quality enhances instructional delivery and promotes better learning outcomes for students. Olaleye (2016) further argues that Quality assurance fosters teacher professionalism by motivating educators to continually update their knowledge, refine instructional methods, and adopt global best practices. Through these mechanisms, Quality assurance not only improves the quality of teaching but also enhances student engagement and learning effectiveness.

In addition, Quality assurance enhances institutional competitiveness. With globalization expanding the higher education marketplace, institutions must demonstrate that their programmes meet internationally recognized standards. Pavel (2012) notes that universities with strong QA systems are more likely to attract both local and international students, establish global partnerships, and participate in academic exchanges. This competitiveness enhances institutional reputation, encourages cross-border collaboration, and strengthens national visibility in the global academic arena.

Furthermore, Quality assurance contributes to sustainable national development. Quality higher education produces graduates equipped with the knowledge, skills, and values required to participate effectively in the social, economic, and political

life of the country. Obadara and Alaka (2013) argue that quality-driven education is critical for developing leaders, innovators, and professionals capable of addressing societal challenges and driving economic growth. Njoku (2016) also highlights that sustained quality in higher education is closely linked to national development, improved governance, and enhanced social outcomes. By ensuring that institutions remain responsive to societal needs and aligned with national development goals, QA strengthens the overall capacity of the education system to contribute meaningfully to the country's progress.

The Principles of Quality Assurance Universities in Nigeria

Quality assurance (QA) in higher education has emerged as a critical policy and operational concern in Nigeria, particularly in response to rapid expansion, increased student enrolment, diversification of institutions, and growing societal expectations. Higher education plays a vital role in Nigeria's national development by producing skilled manpower, fostering innovation, and promoting socio-economic transformation. Consequently, ensuring and sustaining quality in teaching, learning, research, and service delivery has become a central objective of higher education governance. Quality assurance in Nigeria refers to the systematic processes and mechanisms put in place to ensure that higher education institutions meet established academic standards and continuously improve their performance.

A fundamental principle guiding quality assurance in Nigerian higher education is institutional responsibility for quality. While regulatory agencies such as the National Universities Commission (NUC), the National Board for Technical Education (NBTE), and the National Commission for Colleges of Education (NCCE) provide oversight and set minimum standards, higher education institutions are primarily responsible for the quality of their academic provision. This principle recognizes that quality cannot be imposed externally but must be internally generated, sustained, and owned by institutions themselves. Universities and other tertiary institutions are therefore expected to establish internal quality assurance units that monitor curriculum delivery, assessment practices, staff performance, and student support services.

Closely related to institutional responsibility is the principle of compliance with minimum academic standards. In Nigeria, quality assurance is anchored on nationally defined benchmarks such as the Benchmark Minimum Academic Standards (BMAS) developed by the NUC for university programmes. These standards specify minimum requirements for curriculum content, course credit units, staffing ratios, infrastructure, library holdings, laboratories, and admission criteria. Compliance with these standards ensures uniformity, comparability, and credibility of academic programmes across institutions, particularly in a system characterized by rapid growth and the proliferation of public and private universities (Ajayi & Akindutire, 2007).

Another key principle of quality assurance in Nigerian higher education is accountability and transparency. Higher education institutions are accountable to the government, funding agencies, students, parents, employers, and the wider society. Given the substantial public investment in tertiary education and the growing cost of private education, there is increasing demand for institutions to demonstrate efficiency, effectiveness, and value for money. Accreditation exercises, institutional audits, and programme evaluations serve as accountability mechanisms that provide evidence of compliance with academic standards and prudent use of resources. The publication of accreditation results and institutional rankings further enhances transparency and public confidence in the system; (Okebukola, 2010).

Quality assurance in Nigeria is also guided by the principle of continuous improvement and enhancement. Quality is not perceived as a static achievement but as a dynamic and ongoing process that requires regular evaluation and refinement. Institutions are encouraged to engage in periodic programme review, peer evaluation, student feedback analysis, and graduate tracer studies in order to identify strengths, address weaknesses, and improve academic delivery. This improvement-oriented approach moves quality assurance beyond a one-time accreditation exercise toward a sustainable quality culture within institutions (Okebukola, 2015).

The principle of relevance to national development and labour market needs is central to quality assurance in Nigerian higher education. Academic programmes are expected to align with Nigeria's socio-economic priorities, manpower needs, and development plans. Regulatory bodies emphasize curriculum relevance by encouraging collaboration between institutions, industry, professional bodies, and employers in curriculum design and review. This ensures that graduates possess not only theoretical knowledge but also practical skills, entrepreneurial competencies, and employability attributes required in the labour market (Saint et al., 2003; National Policy on Education, 2014).

Equity and access constitute another important principle of quality assurance in Nigeria. While expanding access to higher education is a national priority, such expansion must be balanced with quality considerations. Quality assurance mechanisms aim to ensure that increased enrolment does not outstrip institutional capacity in terms of staffing, infrastructure, and learning resources. In addition, institutions are encouraged to promote inclusiveness by providing supportive learning environments for students from diverse socio-economic backgrounds, including students with disabilities and other disadvantaged groups (Federal Republic of Nigeria, 2014; Ajayi & Ekundayo, 2010).

Stakeholder participation is also a guiding principle of quality assurance in Nigerian higher education. Effective quality assurance requires the active involvement of academic staff, students, administrators, employers, alumni, and regulatory agencies. Academic staff play a crucial role in maintaining standards through teaching,

research, and curriculum development, while students provide valuable feedback on learning experiences and institutional services. Employers and professional bodies contribute insights into labour market expectations and professional standards, thereby strengthening the relevance and credibility of academic programmes (Harvey & Green, 1993; Okebukola, 2010).

Finally, quality assurance in Nigerian higher education emphasizes the principle of quality culture development. A quality culture refers to shared values, beliefs, and practices that prioritize continuous improvement and academic excellence. Rather than viewing quality assurance as a bureaucratic or compliance-driven exercise, institutions are encouraged to integrate quality considerations into their everyday academic and administrative activities. Leadership commitment, staff development, student engagement, and evidence-based decision-making are critical to fostering a sustainable quality culture within Nigerian higher education institutions (Schindler et al., 2015; NUC, 2012).

Approaches to Sustaining Quality in University Education in Nigeria

In Nigeria, maintaining quality in university education has become increasingly challenging due to factors such as inadequate funding, poor infrastructure, enrolment pressure, weak governance, and insufficient academic staffing. As a result, there is a growing need for comprehensive quality control measures that will ensure the sustainability of university education. These measures cut across leadership, academic processes, monitoring mechanisms, policy formulation, and regulatory oversight.

1. **Leadership and Governance:** The quality of any university system largely depends on the effectiveness of its leadership. University administrators, particularly vice-chancellors and principal officers, occupy strategic positions that shape institutional direction and performance. When leadership lacks competence, integrity, and vision, the overall quality of education is negatively affected. Effective university governance requires administrators who possess strong managerial skills, deep understanding of academic culture, and the ability to make informed decisions in complex environments.

   University leaders are expected to demonstrate transparency, accountability, and professionalism in managing institutional affairs. They must also adopt modern leadership styles that encourage participation, innovation, and continuous improvement. Beyond routine administration, leaders should be forward-looking and responsive to emerging challenges such as technological change, globalization of education, and increased competition among institutions. Sustainable leadership is achieved when administrators efficiently utilize available human and material resources to achieve institutional goals while maintaining academic standards.

2. **Internal Quality Management Practices:** For universities to sustain quality, they must establish effective internal quality management systems. These systems consist of policies, procedures, and structures designed to ensure that academic and administrative activities are conducted in line with approved standards. Internal quality management focuses on preventing errors, identifying weaknesses early, and promoting continuous improvement across all units of the institution.

   One of the most important components of internal quality management is the regulation of student admission. Admitting unqualified students undermines teaching effectiveness and reduces the overall quality of graduates. In Nigeria, centralized entrance examinations conducted by national bodies, complemented by institution-based screening processes, serve as mechanisms for regulating access to university education. When properly implemented, these processes help ensure that admitted students possess the academic and moral capacity to cope with university-level work.

3. **Teaching Effectiveness and Student Learning:** Teaching and learning remain at the core of university education. The quality of instruction delivered by academic staff directly influences student learning outcomes and graduate competence. Even when students are academically capable, poor teaching methods, inadequate preparation, and lack of commitment from lecturers can limit their academic achievement and career development.

   University lecturers are expected to demonstrate mastery of their subject areas and apply appropriate teaching strategies that enhance understanding and critical thinking. Effective teaching goes beyond content delivery; it includes mentoring, academic advising, and the development of students' intellectual and ethical values. Lecturers are also expected to update their knowledge regularly through research, professional development, and exposure to new teaching technologies. A learning environment that promotes interaction, creativity, and inquiry is essential for producing graduates who can compete globally.

4. **Academic Oversight and Accountability:** Oversight mechanisms are essential for ensuring that academic activities are carried out according to institutional and national standards. Academic oversight involves supervision of teaching, assessment of staff performance, and enforcement of academic regulations. Through effective oversight, universities can identify gaps in instructional quality and address them promptly.

   Supervisory structures within universities should not be punitive but supportive. They should encourage professional growth, adherence to best practices, and continuous improvement. Academic accountability also

extends to students, who must comply with institutional rules and ethical standards. When oversight is effective, it creates a culture of responsibility and excellence that supports quality assurance across the institution.

5. **Monitoring, Evaluation, and Continuous Improvement:** Monitoring and evaluation are critical tools for sustaining quality in university education. Through regular assessment of academic programmes, administrative processes, and institutional performance, universities can determine whether their objectives are being achieved. Monitoring enables early detection of problems, while evaluation provides evidence for informed decision-making and policy adjustment.

   At the departmental and faculty levels, routine reporting and performance reviews help ensure that activities align with institutional goals. Feedback from monitoring and evaluation processes should be systematically communicated to management and used to guide improvement efforts. Continuous improvement is achieved when institutions learn from evaluation outcomes and implement corrective measures consistently.

6. **Role of National Regulatory Agencies**

   Quality assurance in university education is not solely an institutional responsibility; it also involves external regulation and support. In Nigeria, national regulatory agencies play a crucial role in setting standards, monitoring compliance, and guiding institutional development. These agencies provide policy direction, coordinate funding allocation, and ensure that universities operate within approved frameworks.

   Through accreditation exercises, programme evaluation, and performance assessment, regulatory bodies help maintain uniform standards across institutions. They also support capacity building initiatives aimed at improving teaching, research, and learning infrastructure. External oversight strengthens public confidence in university qualifications and promotes accountability within the system.

Policy Frameworks for Strengthening Quality Assurance in Nigerian Universities

Curriculum Development and Relevance: A responsive and relevant curriculum is central to quality assurance in university education. Curricula must be periodically reviewed to reflect changes in societal needs, technological advancement, and labour market demands. A rigid curriculum that fails to adapt to contemporary realities limits graduate employability and national development. Modern curriculum design emphasizes flexibility, learner-centered approaches, and integration of practical experiences. The use of digital technologies, problem-based learning, and

community engagement enhances students' learning experiences and prepares them for real-world challenges. Government agencies responsible for education continue to support curriculum reforms aimed at aligning university education with national development goals and global trends.

Persistent Challenges Undermining Quality: Despite policy efforts, several challenges continue to weaken quality assurance in Nigerian universities. These challenges include inadequate funding, poor infrastructure, shortage of qualified academic staff, and excessive student enrolment. Overcrowded classrooms, poorly equipped laboratories, and under-resourced libraries reduce teaching effectiveness and research productivity. Other challenges include frequent industrial actions, student unrest, insecurity on campuses, and weak staff retention policies. Excessive emphasis on paper qualifications rather than practical competence has also contributed to declining standards. Additionally, the migration of students to foreign institutions reflects growing dissatisfaction with local university quality and further highlights the need for systemic reform.

Strategic Planning and Institutional Self-Assessment: Strategic planning is an essential component of sustainable quality assurance. Universities must engage in deliberate planning processes that define institutional priorities, allocate resources effectively, and guide long-term development. A key element of strategic planning is institutional self-assessment, which involves analyzing internal strengths and weaknesses as well as external opportunities and threats. This analytical approach enables universities to identify performance gaps and design targeted interventions. Strategic planning should be inclusive, involving academic staff, administrators, students, and external stakeholders. Effective implementation, monitoring, and periodic review of strategic plans are necessary to ensure that quality improvement efforts produce meaningful results.

National Quality Standards and Accreditation: The establishment of national quality standards provides a common framework for evaluating university performance. These standards define minimum requirements for academic programmes, staffing, facilities, and governance. Accreditation exercises assess institutional compliance with these standards and provide feedback for improvement. All categories of universities federal, state, and private are subject to national quality regulations. Accreditation outcomes influence public perception, student choice, and institutional credibility. When properly implemented, accreditation promotes competition, accountability, and continuous improvement within the university system.

Internal and External Review Mechanisms: Quality assurance operates through both internal and external review processes. Internal reviews focus on admission standards, curriculum approval, staff evaluation, student assessment, and programme review. These processes are designed to ensure that institutional practices align with stated objectives and quality expectations. External reviews, on the other hand,

involve independent assessment by regulatory agencies and professional bodies. These reviews provide objective evaluation of institutional performance and encourage adherence to national and international benchmarks. The combination of internal and external review mechanisms strengthens quality assurance and enhances institutional credibility.

Implications

1. Policymakers must recognize that QA is a strategic investment rather than an administrative burden. Strengthening QA contributes to national development, international competitiveness, and social stability.
2. Quality assurance policies must be aligned with broader national goals such as economic growth, innovation, and employment. QA frameworks should emphasize relevance, sustainability, and responsiveness to national needs.
3. Policy must promote stakeholder involvement. Students, employers, faculty, regulatory bodies, and communities should play active roles in shaping quality policies. Inclusive policy development enhances relevance and buy-in.
4. Policies must support institutional autonomy. While regulation is necessary, institutions should have enough flexibility to innovate, experiment, and tailor quality systems to their unique contexts.
5. Policy should prioritize digital transformation. Technology-driven QA systems improve accuracy, efficiency, and transparency. Policymakers should invest in digital infrastructure and capacity building. Finally, policy must support equity. Quality assurance should help reduce disparities, promote inclusivity, and ensure that all students regardless of background have access to quality education.

The way forward

To strengthen Quality Assurance and academic standards, the following policy recommendations should be considered:

1. **Institutionalize Continuous Improvement:** Quality assurance should be viewed as an ongoing process rather than a one-time exercise. Institutions should adopt feedback-driven practices that support continuous enhancement. Quality assurance and academic standards are indispensable components of modern higher education systems. They ensure that institutions deliver relevant, credible, and high-quality academic programmes that prepare students for the complexities of the contemporary world. As nations pursue economic development, social stability, and global competitiveness, higher education must evolve to meet rising expectations.

2. **Expand Funding for Quality Assurance Initiatives:** Governments should allocate targeted funding to support Quality Assurance activities such as accreditation, staff training, infrastructure improvement, and digitalization.

3. **Build Capacity of Academic and Administrative Staff:** Continuous professional development programmes should be institutionalized to ensure that staff understand and effectively implement Quality Assurance systems.

4. **Integrate Digital Technologies into QA Processes:** Digital platforms should be used for monitoring, assessment analytics, data management, and quality reporting.

5. **Promote Stakeholder Engagement:** Quality Assurance systems should incorporate input from students, employers, alumni, and regulatory bodies to ensure relevance, inclusivity, and shared ownership.

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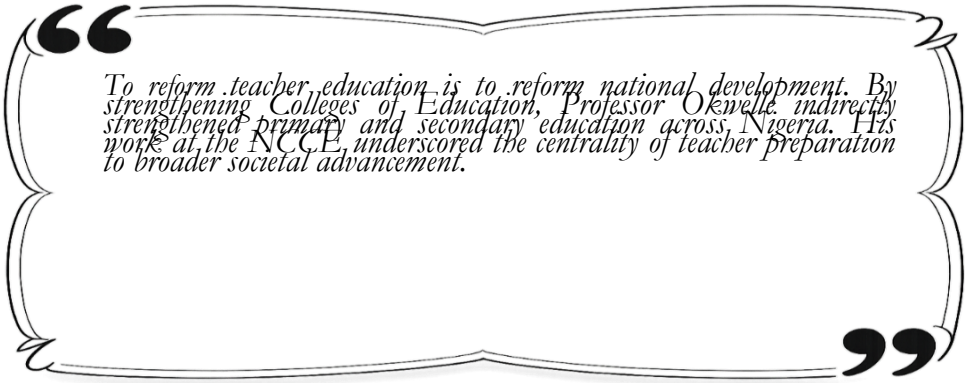
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Chapter 25

Comparative Education and the Application of Global Best Practices in School Systems

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Abstract

Comparative education is an interdisciplinary field that examines educational systems across countries to generate practical insights for improving school systems in a globalized world. Beyond identifying similarities and differences, it serves as a strategic tool for analyzing and adapting global best practices that enhance educational quality, equity, and system resilience. Through international comparisons, comparative education highlights innovative approaches in curriculum development, digital learning integration, teacher professional development, inclusive education, learner assessment, and school leadership. The application of global best practices, guided by comparative analysis, supports evidence-based policymaking and responsive educational reform. Rather than uncritical policy borrowing, comparative education promotes contextual innovation, where proven strategies are adapted to local socio-cultural conditions, institutional capacities, and resource realities. This approach strengthens sustainability, improves accountability, and minimizes reform failure within school systems.In an era of rapid technological change and increasing global interdependence, comparative education encourages international collaboration and continuous learning among education stakeholders. It enables school systems to respond proactively to emerging challenges, design future-ready learning environments, and improve student outcomes. Ultimately, comparative education bridges global experience and local practice, positioning school systems to achieve inclusive, effective, and sustainable educational development.

Keywords: *Comparative education, Interdisciplinary education, educational systems, Globalized education, international comparisons, educational quality*

Introduction

Comparative education is the systematic study of education systems, policies, and practices across different countries or regions in order to identify similarities, differences, and lessons that can improve schooling locally. It's value lies in moving beyond parochial solutions, by comparing how other nations organize curricula, train teachers, assess learning, fund schools, and manage accountability, policymakers and practitioners can adapt proven approaches (rather than copy them wholesale) to fit local cultures and constraints.Contemporary scholars in global comparative education encourage constructive policy learning rather than direct replication of "best practices." Steiner-Khamsi (2014) highlights the importance of understanding how educational reforms are received and translated to align with local socio-cultural and institutional contexts, while Bray (2010) emphasizes the value of methodological rigor and contextual sensitivity in comparative analysis. Together, they stress that effective comparative education is strengthened when global ideas are thoughtfully adapted to local needs and realities.

In Nigeria Yusuf tv(2022) highlights the importance of comparative education as a pathway to system improvement, and Nigeria's education sector requires strategic alignment with global teacher development and curriculum reform models, especially those used in high-performing systems like Finland and Singapore. However, she emphasizes that such practices must be contextualized, noting that Nigeria's infrastructural deficits and inconsistent policy implementation can hinder direct transfer. Eze and Abubakar (2024) maintain that comparative analysis helps Nigeria benchmark its reforms against global standards, particularly in areas of curriculum relevance, inclusive education, and assessment quality, and stresses that global best practices should serve as guiding templates, while Nigeria develops locally adaptable solutions that consider cultural diversity, limited resources, and regional disparities. They also observe that policymakers often underutilize comparative evidence, calling for stronger research policy linkages. From a governance perspective, Okonkwo (2023) notes that many of the world's most effective school systems rely on strong accountability structures, transparent funding mechanisms, and data-driven monitoring processes. He argues that Nigeria can benefit from these models, but only if governance reforms address issues such as politicization of school management, inadequate budgeting, and weak supervision. His work suggests that global best practices require foundational reforms in leadership preparation, policy continuity, and monitoring capacity. Adebayo (2021) and Chukwu (2022) also emphasize the role of comparative education in strengthening Nigeria's curriculum and assessment practices. Adebayo (2021) highlights how global trends in competency-based education can help Nigeria shift from rote learning to skill-oriented teaching, while Chukwu examines the benefits of digital assessment tools widely used in other nations. Both scholars caution that

Nigeria must build digital infrastructure, train teachers, and address inequality in access before adopting such models widely.

Approaches to the Application of Global Best Practices in Comparative Education

Below are generally accepted approaches to applying global best practices in comparative education.

1. The policy borrowing and policy learning approach

This approach in comparative education centers on the systematic examination of successful education policies and practices from other countries with the aim of improving local education systems. While policy borrowing involves adopting specific reforms from foreign contexts, policy learning goes further by critically analyzing the conditions and processes that contributed to their success. This approach emphasizes that educational policies cannot be transferred wholesale due to differences in cultural, institutional, and socioeconomic contexts; therefore, adaptation and contextualization are essential. When effectively implemented, policy borrowing and policy learning promote evidence-based decision-making, foster innovation, and support sustainable educational reform.

2. The contextualization and localization approach

This approach in comparative education focuses on adapting global best practices to suit the unique cultural, social, economic, and institutional conditions of a specific education system. Instead of directly transferring policies from other countries, this approach requires modifying them to reflect local values, learner needs, and available resources. By emphasizing relevance and stakeholder acceptance, contextualization and localization promote local ownership, improve implementation, and enhance the sustainability and effectiveness of educational reforms.

3. The benchmarking and international standards approach

This approach in comparative education compares a country's education system with global benchmarks to identify strengths, weakness and areas for improvement. Tools such as Programme for International Student Assessment (PISA), Trends in International Mathematics and Science Study (TIMSS), and United Nations Educational, Scientific and Cultural Organization (UNESCO) indicators provide data on student performance and teaching quality. These tools help policymakers guide reforms and adopt proven strategies adapted to local contexts.

4. The Cross-National Comparative Analysis Approach

This approach in comparative education involves systematically comparing education systems, policies, and practices across different countries to identify

similarities, differences, and lessons that can inform local improvements. This approach helps policymakers and educators understand how various factors such as governance, curriculum, teaching methods, and assessment strategies affect educational outcomes. By analyzing these differences and patterns, countries can adopt effective practices, avoid common pitfalls, and design reforms that are informed by international experiences while being adapted to their own local context.

5. The capacity building and professional development approach

This approach in comparative education focuses on strengthening the skills, knowledge, and competencies of teachers, school leaders, and education administrators to enhance the quality of education. This approach emphasizes continuous training, mentoring, and leadership development to ensure that educators can effectively implement best practices, adapt innovations, and manage educational reforms. By investing in human and institutional capacity, education systems become better equipped to adopt global best practices, improve teaching and learning outcomes, and sustain long-term improvements in school performance.

6. The Evidence-Based and Data-Driven Approach

This approach in comparative education emphasizes using research findings, empirical data, and measurable outcomes to guide decisions, policies, and reforms in education. This approach ensures that interventions are informed by objective evidence rather than assumptions or tradition, allowing education systems to identify what works, monitor progress, and make necessary adjustments. By relying on data from student assessments, school performance metrics, and educational research, policymakers and educators can implement strategies that are more effective, targeted, and sustainable.

7. The technology-enabled and digital learning approach

This approach in comparative education uses technology, such as computers, tablets, online platforms, and digital tools, to improve teaching and learning. This approach allows students to access learning materials anytime and anywhere, supports interactive and personalized learning, and helps teachers track progress and give feedback more easily. By integrating technology, schools can adopt global best practices, make learning more engaging, and prepare students with skills needed for the digital age.

8. The stakeholder collaboration and partnerships approach

This approach in comparative education emphasizes working together with all parties involved in education—such as government agencies, schools, teachers, parents, communities, non-governmental organizations, and international bodies to improve education standards. By fostering collaboration and partnerships, education systems

can share resources, expertise, and best practices, ensure that reforms meet local needs, and enhance the effectiveness and sustainability of educational initiatives.

9. Pilot Testing and Incremental Implementation Approach

This approach in comparative education is a strategy where new policies, programmes, and practices are first introduced on a limited scale, This allows educators and policymakers to carefully observe how the reforms work in real settings, identify potential challenges, and make necessary adjustments based on feedback and results. By implementing changes gradually, the approach reduces the risks associated with large-scale reforms, ensures better resource allocation, and increases the likelihood of successful adoption. pilot testing and incremental implementation promote more effective, manageable, and sustainable educational improvements, as policies are refined and tailored to local contexts before full-scale application.

10. The monitoring, evaluation, and feedback approach

This approach in comparative education involves systematically tracking and assessing the implementation of policies, programs, and practices to determine their effectiveness. Monitoring observes ongoing progress and identifies emerging issues, while evaluation examines outcomes to assess whether goals are being achieved. Feedback provides stakeholders with information to make informed decisions, adjust strategies, and improve practices. Together, this approach ensures that educational reforms are effective, responsive, and continuously improved.

Conceptual Foundations of Comparative Education

The conceptual foundations of comparative education provide the theoretical and philosophical basis for studying, analyzing, and improving education systems across different countries and contexts. Comparative education is a field that examines education policies, practices, and outcomes globally to identify lessons, understand differences and similarities, and guide improvements in local education systems. Its foundations draw from multiple disciplines, including sociology, psychology, economics, political science, and history, offering a holistic understanding of how education interacts with society.

Philosophical Foundation

The philosophical foundation of comparative education explores the purposes, values, and aims of education. It addresses questions such as what knowledge should be taught, the goals of schooling, and the role of education in individual and societal development. Philosophical perspectives help educators and policymakers define educational objectives and guide decision-making about curriculum, pedagogy, and assessment.

Sociological Foundation

The sociological foundation focuses on the relationship between education and society. It examines how social structures, cultural norms, inequality, and community values influence education systems and outcomes. Comparative education uses sociological insights to understand how education can promote social cohesion, equity, and citizenship, and how societal factors shape learning experiences.

Historical Foundation

The historical foundation investigates the evolution of education systems over time. Understanding the historical context of schooling, policies, and reforms helps explain why certain practices exist, why some systems succeed while others struggle, and how past experiences inform current educational strategies. Comparative studies often use historical analysis to trace the development of educational ideas globally.

Political and Economic Foundation

Education is deeply influenced by political and economic contexts. The political foundation examines government policies, governance structures, and power relations that shape education systems. The economic foundation considers how resources, funding, and economic conditions affect access, quality, and equity in education. These foundations help explain differences in education systems and guide strategies for reform.

Psychological Foundation

The psychological foundation emphasizes learning theories, human development, and teaching methods. It explores how students learn, how motivation and cognition influence outcomes, and how educational practices can be adapted to meet learners' needs. Comparative education uses psychological insights to design effective curricula, instructional strategies, and assessment methods.

Global and Cultural Foundation

Comparative education also rests on a global and cultural foundation, which recognizes that education systems do not exist in isolation. This foundation encourages the study of international best practices, cross-cultural comparisons, and the adaptation of global innovations to local contexts. It fosters understanding of how cultural values, traditions, and global trends influence education.

Definitions of Comparative Education

Comparative education is the systematic study of educational systems, policies, and practices across different countries or regions to understand, evaluate, and improve education (Bray, Adamson, & Mason, 2023). In the school system, it focuses on analyzing similarities and differences in curriculum, teaching methods, assessment

practices, and school management to adopt effective global practices while adapting them to local contexts (Crossley & Watson, 2020 Arrington (2021) describes comparative education as the study of educational systems, practices, and policies across different contexts or countries, using comparative research to understand educational phenomena and generate insights that can help improve education internationally. Yakut-Özek and Sincer (2024) define comparative education as an interdisciplinary science that uses historical, philosophical, sociological, and other social science foundations to examine problems in educational systems from an international perspective, analyzing similarities and differences and offering suggestions for improvement. Therefore comparative education as a discipline that examines educational systems beyond national borders to discover why and how they differ, what factors influence these differences, and what lessons can be applied to improve education locally and globally.

Scope of Comparative Education

The scope of comparative education in the school system is wide-ranging and interdisciplinary, encompassing the study, analysis, and application of educational practices across different countries and cultures to enhance teaching, learning, and policy-making. At its core, comparative education seeks to understand the similarities and differences in educational systems, structures, curricula, instructional strategies, and outcomes, providing evidence-based insights for improving local education.

1. **Curriculum Development:** One major area of scope is curriculum design. Comparative education examines curricula in various countries to identify effective content, sequencing, and pedagogical approaches. This enables schools to adapt or improve their curricula, ensuring that students acquire relevant knowledge and skills that meet both local and global standards.

2. **Teaching and Learning Strategies:** Comparative education also focuses on instructional methods. By analyzing global best practices, such as learner-centered approaches, collaborative learning, and the integration of technology in classrooms, educators can enhance teaching effectiveness, student engagement, and critical thinking.

3. **Assessment Practices**: The field studies evaluation and assessment methods across different systems, including formative, summative, performance-based, and digital assessments. This informs schools on how to implement assessments that are fair, reliable, and supportive of continuous learning, enabling better tracking of student progress and instructional improvement.

4. **Educational Policy and Administration**: Comparative education analyzes governance structures, policy frameworks, and school leadership models internationally. These insights help policymakers and school administrators

develop effective education policies, improve resource management, and implement reforms that enhance system efficiency and quality.

5. **Equity and Access:** The discipline also addresses issues of equity, inclusion, and access to quality education. By comparing how different systems reduce disparities and provide equal opportunities, schools can adopt strategies to promote inclusive education for all learners.

6. **Teacher Education and Professional Development**: Comparative education explores effective teacher training programmes, mentoring, and professional development strategies globally. This helps strengthen teacher competence, pedagogical skills, and capacity to deliver quality education.

7. **Educational Reform and Innovation:** The field examines how educational systems adapt to socio-economic, technological, and cultural changes. By learning from international innovations, schools can implement reforms that improve learning outcomes, efficiency, and responsiveness to societal needs.

8. **Globalization and International Influence:** Finally, comparative education evaluates the effects of globalization, international assessments (e.g., PISA, TIMSS), and global trends on local education systems. This allows schools to benchmark against international standards, adopt effective practices, and improve competitiveness and educational quality.

Theoretical Analysis

Theoretical analysis refers to the process of examining, interpreting, and understanding a subject or phenomenon through established theories or conceptual frameworks. It involves applying theoretical perspectives to explain why something happens, identify patterns, and explore relationships between concepts. In education, theoretical analysis helps researchers and policymakers understand the underlying principles, structures, and functions of educational systems, rather than just describing observable practices

1. Functionalist Theory

Functionalist theory, in comparative education, explains schooling as a key social institution designed to promote social stability, cohesion, and economic productivity by equipping individuals with shared values, knowledge, and skills. Contemporary scholars emphasize that education systems across countries perform similar core functions—such as human capital development, social integration, and role allocation though these functions are shaped by differing cultural, political, and economic contexts (Haralambos & Holborn, 2023). From a comparative perspective, functionalism is used to analyze how nations adapt education structures, curricula, and assessment practices to meet societal needs and respond to globalization,

technological change, and labor market demands (Bray et al., 2024; Baker, 2023). Recent studies argue that functionalist analysis remains relevant in comparative education by highlighting how global education reforms are localized to sustain system efficiency and social order while supporting national development goals (Verger et al., 2023).

2. Conflict Theory

Conflict theory, as applied to comparative education, examines how power relations, social class, and economic inequalities shape educational systems and outcomes across societies. Drawing from Marxist traditions, the theory views education not as a neutral institution but as a mechanism that often reproduces social inequality by privileging dominant groups through curriculum control, resource allocation, and access to quality schooling (Apple, 2019). In comparative contexts, conflict theorists analyze how global structures such as capitalism, colonial legacies, and neoliberal policies influence national education systems differently, often widening disparities between and within countries (Carnoy, 2021). Recent scholars argue that comparative education, informed by conflict theory, helps reveal how international reforms and global best practices may reinforce existing power imbalances rather than promote equity, particularly in developing contexts (Tikly, 2020; Verger et al., 2023).

3. Human Capital Theory.

The human capital theory in comparative education emphasizes that education is not merely a social or cultural activity but a strategic investment in people that enhances their skills, knowledge, and productivity, thereby contributing to economic growth and national development (Becker, 1993). From a comparative perspective, this theory helps explain why education systems differ across countries, particularly in the emphasis they place on vocational training, technical skills, and higher education to meet labor market demands (Schultz, 2017). Countries that invest heavily in education and human capital development tend to experience higher productivity, innovation, and competitiveness in the global economy. In Nigeria, recent studies highlight that strengthening educational quality, expanding access to vocational and technical training, and developing workforce skills are essential for improving employability and addressing socioeconomic challenges (Adeyemi, 2020; Okafor & Alabi, 2021). Overall, human capital theory underscores the strategic importance of education as a tool for both individual advancement and national economic development, guiding policymakers in designing systems that align learning outcomes with economic needs.

4. Cultural theory

The cultural theory in comparative education emphasizes that education systems are shaped by cultural values, beliefs, language, and traditions, which influence

curricula, teaching methods, and learning outcomes across countries. It highlights how dominant cultural values can advantage some learners over others (Bourdieu, 1986) and stresses the need to consider cultural context in comparative analysis and policy transfer (Hofstede et al., 2010; Crossley, 2019). Recent Nigerian studies further demonstrate that effective adaptation of global education reforms depends on a clear understanding of local cultural realities (Adeyemi, 2020; Oyeniran & Alabi, 2021)

5. Sociological Theory

The sociological theory in comparative education examines how social structures and relationships shape education systems and outcomes. It highlights the influence of factors such as social class, culture, power, and inequality (Ballantine & Hammack, 2020) and explains differences between education systems globally (Crossley, 2019). Recent studies show that globalization, socioeconomic disparities, and cultural diversity affect access, quality, and equity in education. In Nigeria, poverty and regional inequalities significantly impact participation and reform effectiveness, emphasizing the importance of sociological analysis in comparative education (Adeyemi, 2021; Ofoha & Aluede, 2022).

Methodological Foundations of Comparative Education

Methodological Foundations are built on systematic, rigorous, and context-sensitive approaches that enable researchers to study similarities and differences in education systems, policies, and practices across societies. Contemporary scholars emphasize that comparative education relies on a combination of qualitative and quantitative methods to provide a comprehensive understanding of educational phenomena and to generate evidence-based insights (Bray et al., 2024) Baker,(2023) listed the items below as the methodological Foundations

1. Historical Methodology

The historical methodology in comparative education examines the evolution and transformation of educational systems, policies, and practices over time, highlighting how social, political, economic, and cultural contexts shape contemporary education (Tikly, 2020; Bray et al., 2024). It helps explain differences and similarities across countries, including the influence of colonial legacies, policy transfers, and global education trends (Baker, 2023). Techniques such as archival research and document analysis are commonly used to reconstruct educational histories. This approach provides a foundation for understanding present-day education and guiding policy and reform initiatives (Verger et al., 2023).

2. Cross-National Statistical Methodology.

Cross-national statistical methodology in comparative education uses quantitative data to compare educational systems, policies, and outcomes across countries. It identifies trends in student achievement, access, and resource distribution, providing evidence for policy and reform (Baker, 2023; Bray et al., 2024). Large-scale assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS) reveal inequalities and factors affecting educational success at national and global levels (Schleicher, 2022; Verger et al., 2023). This approach supports the evaluation of reforms and the adaptation of global best practices to diverse educational contexts.

3. Quantitative case methodology in comparative education

Quantitative case methodology uses numerical data within specific educational settings to identify patterns, measure variables, and support evidence-based comparisons. Common techniques include surveys, standardized tests, and statistical analyses to examine outcomes such as student achievement, resource allocation, or policy effects (Klees, 2017). By combining the contextual focus of individual cases with quantitative rigor, this approach provides systematic insights into educational processes and informs policy decisions across diverse contexts.

4. Comparative Policy methodology

Comparative policy methodology in comparative education systematically examines and compares education policies across countries, focusing on how they are formulated, adapted, and implemented. Contemporary scholars such as Steiner-Khamsi (2024) emphasize its role in understanding policy transfer and the adaptation of global reforms to local contexts. Studies often use policy document analysis and cross-national comparisons, with insights from scholars like Verger, McKenzie, and Takayama (2024) highlighting how context shapes policy effectiveness. This methodology provides evidence-based guidance for improving educational policies across diverse settings.

5. Ethnographic Research Methodology

Ethnographic research methodology in comparative education studies schools, classrooms, and educational practices by observing, interviewing, and participating in daily activities. This approach helps researchers understand how social, cultural, and political factors shape learning and teaching (Hammersley & Atkinson, 2023; Tikly, 2020). Scholars such as Bourdieu and Passeron (2021) and Johnson (2022) emphasize that ethnography provides rich, real-life insights into student experiences, teacher practices, and policy implementation that cannot be captured by quantitative data alone. By examining education in context, this method helps improve teaching, learning, and educational policies across different countries.

6. Mixed methodology

Mixed methodology Integrates quantitative and qualitative data to produce more holistic and reliable analyses. It uses surveys, tests, interviews, and observations to explore both patterns and meanings in data (Meng & Wang, 2024; Adhikari & Timsina, 2024). noted that this method provides a more complete understanding of policy implementation, teaching, and learning, offering evidence-based insights for improving education in diverse contexts

Contemporary perspectives of comparative education

1. Globalization Perspective

This perspective focuses on how global trends, international organizations, and worldwide economic pressures shape national education systems. It examines the circulation of educational ideas, policies, and practices across countries, such as international benchmarks, curriculum models, and assessment standards. Researchers highlight that while globalization encourages countries to adopt global best practices, successful implementation depends on adapting them to local cultural, political, and institutional contexts (Verger et al., 2023; Bray et al., 2024).

2. Equity and Social Justice Perspective

This approach emphasizes fairness and inclusivity in education. It investigates disparities in access, resources, and learning outcomes, especially among marginalized groups such as girls, students with disabilities, or disadvantaged communities. Comparative education research under this perspective explores how policies and programs can promote equal opportunities, reduce inequality, and support social mobility. For example, initiatives to expand access to primary and secondary education or scholarship programs reflect this focus (Tikly, 2020).

3. Innovation and Reform Perspective

This perspective examines the introduction and implementation of new teaching methods, curricula, assessment strategies, and technologies in educational systems. It focuses on understanding how innovations improve student learning, the challenges of implementing reforms, and the ways global practices are adapted locally. Scholars also study how educational reforms respond to societal changes, labor market demands, and technological advancements, aiming to enhance the overall quality and relevance of education (Verger et al., 2023).

Rationale for comparing education systems: the Nigeria perspective

Comparing education systems provides Nigeria with valuable insights into how other countries organize, implement, and evaluate education, offering lessons that can

improve its own educational policies and practices. The rationale for this comparative approach in Nigeria includes the following

1. Policy Improvement and Reform

By examining the successes and challenges of other education systems, Nigeria can adopt evidence-based policies and reforms tailored to its context. Comparative studies help identify best practices in curriculum development, teaching methods, assessment strategies, and school management (Bray et al., 2024).

2. Global Competitiveness

In an increasingly globalized world, Nigerian students and graduates need to meet international standards. Comparing education systems allows Nigeria to align its educational objectives, competencies, and learning outcomes with global benchmarks such as PISA and TIMSS (Schleicher, 2022).

3. Addressing Educational Inequalities

Comparative research highlights strategies other countries use to improve access, equity, and inclusiveness in education. Nigeria can learn from these examples to address regional disparities, gender gaps, and socio-economic barriers that affect student learning (Tikly, 2020).

4. Enhancing Quality of Teaching and Learning

Studying other systems provides insights into effective teacher training, instructional methods, and assessment practices. Nigerian policymakers can adopt or adapt these approaches to enhance classroom effectiveness and student achievement (Verger et al., 2023).

5. Informed Decision-Making and Planning

Comparative education provides empirical data and evidence for policy formulation, strategic planning, and resource allocation. This reduces reliance on trial-and-error methods and helps Nigeria implement reforms with greater efficiency and effectiveness (Bray et al., 2024).

Global Best Practices in Education

Global best practices in education refer to strategies, policies, programs, and teaching methods that have been proven effective across different countries and educational contexts. These practices are identified through comparative studies, international assessments, and research on educational innovations, and they serve as benchmarks for improving student learning, teacher effectiveness, and school management (Bray et al., 2024; Steiner-Khamsi, 2024).

Areas of Global Best Practices Include:

1. Curriculum and Instruction

Curriculum and instruction are considered global best practices in comparative education because they shape what students learn and how they learn it, emphasizing learner-centered, skills-oriented teaching that prepares students for real-world challenges. In the Nigerian context, research shows that effective curriculum management strategies and quality classroom instruction enhance student engagement and learning outcomes, particularly when instructional activities encourage mastery goals and frequent evaluation (Abdullahi, 2022). Studies on curriculum reform in Nigeria's basic education also highlight the movement toward competency-based, learner-focused curricula, which align with international best practices by promoting critical thinking, problem-solving, and practical skills (Al-Hikmah University studies on CBC reform, 2025). Furthermore, quality curriculum content that reflects national development goals supports sustainable education and workforce readiness, reinforcing the need to adapt global best practices to local Nigerian conditions (Bello, 2024).

2. Assessment and Evaluation

Assessment and evaluation are key best practices in comparative education, guiding teaching and improving learning outcomes. In Nigeria, formative and summative assessments help align curriculum goals with student performance and support evidence-based reforms (Okeke & Nwankwo, 2023; Bello, 2024). By integrating assessment with instruction, Nigeria can adopt global best practices while addressing local education needs.

3. Teacher Training and Professional Development

Teacher training and professional development are key best practices in comparative education, as well-prepared teachers improve student learning outcomes. In Nigeria, structured training programs, in-service workshops, and continuous professional development enhance teaching effectiveness and help implement curriculum reforms and assessment strategies (Nwankwo, 2023)

4. School Leadership and Management

From a comparative education perspective, school leadership and management involve adopting proven leadership practices from different education systems to enhance school effectiveness. On this note, high-performing systems shows that instructional leadership, which prioritizes teaching quality, curriculum delivery, and student learning outcomes, is central to effective school management. Hallinger (2018) Comparative studies also emphasize distributed leadership, where leadership responsibilities are shared among school leaders, teachers, and other stakeholders to

strengthen collaboration and accountability. Harris, (2019). In addition, strategic and data-driven management practices enable school leaders to plan effectively, allocate resources efficiently, and monitor school performance for continuous improvement Organization for Economic Co-operation and Development (OECD, 2021).Sustained professional development and capacity building for school leaders further support adaptability and long-term school improvement across diverse educational contexts (Bush & Glover, 2019)

5. Equity and Inclusion

Equity and inclusion in education, from a comparative education perspective, focus on providing fair access to quality education for all learners, regardless of gender, socioeconomic background, disability, or ethnicity. Major best practices emphasize targeted support for disadvantaged students, such as remedial programs, scholarships, or mentoring, to reduce learning gaps (Ainscow, 2020). Inclusive curriculum design is also critical, ensuring that teaching materials and classroom activities accommodate diverse learning needs and promote meaningful participation (Florian & Black-Hawkins, 2011). Additionally, removing systemic and structural barriers—such as discrimination, bias, or inaccessible school facilities—ensures equitable opportunities for all students (UNESCO, 2020). Comparative studies of high-performing countries like Finland and Canada show that when equity and inclusion are prioritized, schools not only improve academic outcomes but also foster social cohesion, mutual respect, and learner confidence (OECD, 2021). These practices demonstrate that integrating equity and inclusion into leadership, policy, and classroom strategies is essential for creating effective and just education systems.

Technology Integration and Digital Learning in Nigeria

focus on using digital tools and platforms to enhance teaching, learning, and school administration. Schools increasingly adopt e-learning platforms, virtual classrooms, mobile learning, and interactive educational apps to provide flexible, learner-centered education (Adeyemi & Jegede, 2020; Oye, Iahad, & Ab.Rahim, 2012). The COVID-19 pandemic accelerated the shift toward digital learning, exposing challenges such as limited internet access, inadequate infrastructure, and gaps in teacher digital literacy (UNESCO, 2021). Comparative studies highlight that effective technology integration requires teacher training, curriculum adaptation, and government support to align digital learning with global best practices, improve engagement, and ensure equitable access to educational resources (Selwyn, 2020; OECD, 2021).

1. Historical perspectives of Technology in Nigerian Education

The historical development of technology in Nigerian education traces the gradual adoption of instructional tools to enhance teaching and learning. In the early stages, education in Nigeria relied on traditional print-based materials, radio, and television

to support distance learning and reach learners outside conventional classrooms (Obilade, 2012). The late 20th century saw the introduction of computers and basic ICT facilities in schools and tertiary institutions, signaling a shift toward more interactive instructional methods (Adesote, 2022). Early initiatives focused on bridging access gaps and familiarizing both teachers and students with emerging technologies, although widespread integration was limited by infrastructure and funding constraints. By the 2010s, the proliferation of Internet connectivity and mobile devices allowed for the emergence of digital learning tools and online educational content, setting the stage for e-learning and blended learning practices (Usman, Obisesan, & Ifabiyi, 2025). The COVID-19 pandemic accelerated this trend, highlighting the potential of technology to maintain learning continuity while exposing persistent challenges such as limited access and low digital literacy among educators and learners (Nwobodo & Udoka, 2025). Overall, the historical trajectory shows a progression from analog and basic ICT tools to more sophisticated digital platforms, reflecting Nigeria's gradual alignment with global educational technology trends.

2. Digital Learning Platforms.

Digital learning platforms are central to Nigeria's technology integration and digital learning trends, offering flexible and interactive educational experiences that extend beyond traditional classrooms. These platforms, including virtual classrooms, mobile apps, and web-based tools, support both synchronous and asynchronous learning, enabling students to engage with curriculum content at their own pace (Oyewole, Dauda, & Fasipe, 2025). Platforms such as Afrilearn provide curriculum-aligned lessons, practice exercises, and personalized dashboards for primary and secondary learners, enhancing engagement and exam readiness. Initiatives like the Nigeria Learning Passport further promote inclusive education by delivering interactive digital resources even in low-connectivity areas. By facilitating blended learning, self-paced study, and equitable access, digital learning platforms demonstrate how technology integration can improve educational outcomes in Nigeria, while also highlighting challenges related to infrastructure, Internet access, and teacher preparedness (Oyewole, Dauda, & Fasipe, 2025).

3. Mobile Learning and Educational Apps

Mobile learning and educational apps are transforming technology integration and digital learning in Nigeria by providing learners with flexible, accessible, and personalized educational experiences. With the widespread adoption of smartphones and mobile devices, students can access curriculum-aligned lessons, practice exercises, and interactive resources anytime and anywhere, which supports both formal classroom instruction and informal, self-directed learning (Aina, 2025). Platforms such as uLesson and Pass.ng offer structured lessons, quizzes, and exam preparation tools that align with national curricula, enabling students to track

progress, strengthen understanding, and improve performance. Similarly, homegrown apps like Afrilearn provide animated lessons, interactive dashboards, and real-time feedback, which help learners engage with content actively and develop critical thinking skills (Ekwu, Njoku, Ikwuanusi, & Madu, 2025).Mobile learning also enhances STEM education by incorporating simulations, problem-solving exercises, and interactive experiments, bridging the gap left by traditional lecture-based methods. Additionally, these tools facilitate collaborative learning, allowing students to communicate with peers, participate in discussion forums, and engage in group projects online.

4. Teacher Digital Literacy and Training

Teachers' digital literacy and training are pivotal for the successful integration of technology and the advancement of digital learning in Nigeria. Research shows that access to digital tools alone does not guarantee improved learning outcomes; teachers must possess the skills and confidence to use these tools effectively in classroom instruction (Adebayo & Olaniyi, 2024). Digital literacy encompasses competencies such as operating computers and mobile devices, navigating educational software, managing learning management systems, and utilizing online communication platforms, all of which enable teachers to create interactive, learner-centered lessons and provide timely feedback (Ogundele, 2025). Professional development and in-service training programs have been shown to significantly enhance teachers' ability to integrate digital tools such as uLesson, Afrilearn, and Pass.ng into their teaching practices, fostering greater student engagement, personalized learning, and improved academic performance (Owolabi & Akinyemi, 2025). Additionally, digital training equips teachers to implement blended and hybrid learning models, conduct virtual classrooms, and support students in self-directed and collaborative learning activities.

5. COVID-19 and the Shift to Online Learning

The outbreak of COVID-19 compelled education systems in Nigeria to transition rapidly from traditional face-to-face instruction to online learning, thereby accelerating technology integration and digital learning practices. Adedoyin and Soykan (2023) Indicated that the pandemic significantly increased teachers' and institutions' reliance on learning management systems, mobile learning platforms, and video-conferencing tools to sustain instructional continuity . Afolayan,(2022). Studies conducted within the Nigerian context further reveal that COVID-19 normalized online and blended learning models, positioning digital technologies as central components of teaching and learning in the post-pandemic era (Ogunode, Abigeal, & Lydia, 2023). However, research by Nigerian scholars also shows that the rapid shift exposed persistent challenges, including inadequate digital infrastructure, limited teacher digital competence, and unequal access to devices and reliable internet connectivity, particularly in public schools and rural areas (Olatunde-

Aiyedun & Ogunode, 2024). Overall, COVID-19 served as a catalyst for sustained technology integration in Nigerian education.

6. Policy and Government Initiatives

Government policy and public initiatives have remained central to the advancement of technology integration and digital learning within Nigeria's education system. Recent Nigerian studies indicate that national education policies promoting ICT use in schools have supported the adoption of online and blended learning platforms across basic, secondary, and tertiary education levels. Ogunode (2023). Stated that government-driven initiatives, including digital classroom projects, ICT infrastructure provision, and nationwide teacher capacity-building programmes, have enhanced teachers' willingness and ability to integrate digital tools into instructional practices (Afolayan & Adebayo, 2024). However, empirical evidence from Nigerian scholars suggests that the impact of these initiatives is constrained by inconsistent policy implementation, inadequate funding, and limited access to reliable electricity and internet services, particularly in rural and public schools (Ajayi, 2025). Overall, policy and government initiatives are critical drivers of sustainable technology integration and digital learning in Nigeria, provided they are supported by effective monitoring, continuous professional development, and equitable resource distribution (Salami & Ibrahim, 2024).

7. Equity and Inclusion in Digital Learning

Equity and inclusion are fundamental for meaningful technology integration and digital learning, ensuring that all students, regardless of socioeconomic background or geographic location, can access and benefit from digital education. In Nigeria, researchers highlight that initiatives aimed at improving digital literacy, teacher capacity, and technical infrastructure within schools have strengthened learners' engagement with online and blended learning, fostering proficiency and active participation in digital education (Akomolehin & Aluko, 2025; Adeleye, Eden, & Adeniyi, 2024). These efforts, supported by inclusive policies and targeted government interventions, demonstrate how technology integration can enhance learning opportunities for all students and promote equitable access to quality education nationwide (Aid for Rural Education Access Initiative, 2025).

8. Blended and Hybrid Learning Models

Blended and hybrid learning models combine traditional classroom instruction with online and technology-mediated activities, serving as key strategies for technology integration and digital learning in Nigeria. Blended learning integrates face-to-face teaching with digital resources, multimedia content, and virtual discussions, enhancing student engagement, flexibility, and digital literacy among learners and teachers. Agim, Igwe, and Olannye, (2025). Hybrid learning builds on this by allowing simultaneous participation in physical and virtual learning spaces, enabling

students to engage onsite or online as needed. Studies in Nigerian secondary schools show that hybrid learning supports learner-centered practices, improves academic performance, and demonstrates the effective use of digital tools such as learning management systems and interactive modules. Adediwura, Babayemi, and Arogundade,(2025). Together, these models highlight how integrating technology can extend learning beyond the classroom, foster collaboration, and create more flexible and inclusive educational environments.

9. Comparative Insights

Comparative insights show how schools in Nigeria use technology to improve teaching and learning. Urban schools often have more digital tools, like online learning platforms and interactive content, which help students learn better and teachers teach more effectively (Adeleye, Eden, & Adeniyi, 2024; Ogunode, 2023). Universities usually have structured online and blended learning programs, while secondary schools use mobile learning and other digital platforms to support lessons (Salami & Ibrahim, 2024; Afolayan & Adebayo, 2024). These studies show that when teachers are trained, policies support technology, and resources are used well, technology integration can create meaningful and inclusive learning for all students in Nigeria.

Challenges in Adopting Global Comparative Education Best Practices.

The adoption of global comparative education best practices faces multidimensional challenges ranging from cultural and infrastructural limitations to policy, financial, and socio-technical barriers like the following:

1. Cultural and Contextual Differences

Cultural and contextual differences are central challenges in adopting global comparative education best practices in Nigeria. Nwosu and Igbokwe (2024) emphasize that educational innovations from abroad cannot be directly applied without paying close attention to Nigeria cultural fabric, social norms, and educational realities.

2. Inadequate Infrastructure and Resources

Many global practices rely on modern technology, laboratories, and well-equipped classrooms. Schools in developing regions often face shortages of electricity, internet access, learning materials, and physical infrastructure, making it difficult to implement strategies like digital learning, STEM education, or experiential learning (Adebayo & Musa, 2023).

3. Limited Teacher Training and Professional Development

Teachers may lack exposure to contemporary pedagogical methods and educational technologies. Without continuous professional development, initiatives such as inquiry-based learning, problem-solving approaches, or flipped classrooms remain theoretical rather than practical (Chukwuemeka, 2021).

4. Policy and Regulatory Constraints

National education policies may not support reforms necessary to adopt global best practices. Bureaucratic hurdles, rigid curricula, and standardized examinations often limit flexibility for innovative teaching approaches, leading to a disconnect between policy and practice (Okeke, 2023).

5. Financial Constraints

Implementation of international best practices often requires significant investment. Inadequate funding affects the procurement of learning technologies, teacher training programs, infrastructure upgrades, and monitoring mechanisms, limiting scalability and sustainability (Eze, 2022).

6. Resistance to Change

Stakeholders, including teachers, administrators, and parents, may resist adopting new methods due to fear of unfamiliar practices, increased workload, or skepticism about effectiveness. Change management strategies are often overlooked, impeding smooth adoption (Ibrahim, 2024).

7. Assessment and Evaluation Misalignment

Many global educational strategies emphasize critical thinking, creativity, and collaborative skills, which may not align with local assessment systems that prioritize memorization and standardized testing. This misalignment discourages teachers from implementing innovative methods.

8. Digital Divide and Technological Inequality

The adoption of e-learning and digital pedagogies is limited by unequal access to devices, Internet connectivity, and digital literacy among students and teachers. This digital divide creates inequality in educational opportunities.

9. Socioeconomic Factors

Poverty, student absenteeism, and household responsibilities can hinder the effective adoption of advanced educational practices. Even when schools implement global practices, students from disadvantaged backgrounds may struggle to benefit equally.

10. Language Barriers

Some global best practices are developed in foreign languages, and translation or localization may lose nuance. Students and teachers may find it challenging to engage fully with materials that are not in their mother tongues.

11. Political Instability and Policy Inconsistency

Frequent changes in government policies or leadership can disrupt long-term educational reforms. Lack of continuity undermines sustained adoption of international best education practices.

12. Monitoring and Evaluation Challenges

Schools may lack mechanisms to assess the effectiveness of adopted practices. Without proper evaluation, it is difficult to determine whether global best practices are meeting intended educational outcomes.

Innovative Strategies for Adopting and Improving Global Comparative Education Best Practices in Local Contexts

1. Blended and Hybrid Learning Models

Blended and hybrid learning are approaches that integrate digital technology with traditional classroom instruction, it allows students to combine in-person lessons with online activities, offering flexibility and self-paced study that complements classroom teaching. Hybrid learning, on the other hand, enables some students to attend physically while others participate online in real time, promoting inclusivity and interaction. Essentially, blended learning focuses on combining different learning methods, while hybrid learning emphasizes simultaneous participation and accessibility.

2. Gamification and Experiential Learning

Blended and hybrid learning are approaches that integrate digital technology with traditional classroom instruction. Blended learning allows students to combine in-person lessons with online activities, offering flexibility and self-paced study that complements classroom teaching. Hybrid learning, on the other hand, enables some students to attend physically while others participate online in real time, promoting inclusivity and interaction. Essentially, blended learning focuses on combining different learning methods, while hybrid learning emphasizes simultaneous participation and accessibility.

3. Digital Collaboration and Virtual Exchange Programmes

Digital collaboration and virtual exchange programs use digital technologies to enhance learning and global engagement. Digital collaboration allows learners to work together online, developing teamwork and critical thinking, while virtual exchange programs connect students from different cultures to promote intercultural competence and problem-solving. Both approaches prepare learners for a digitally connected and globally interconnected world.

4. Adaptive and Flexible Curriculum Design

Adaptive and flexible curriculum design represents a contemporary, learner-centered approach that tailors educational experiences to meet diverse student needs while accommodating changing contexts. Adaptive curricula adjust content, learning pathways, and teaching strategies based on students' abilities and performance, often using data-driven tools to enhance engagement and mastery.flexible curricula allow modifications in pace, content, and assessment. Together, they promote inclusivity, lifelong learning, and relevant skill development.

5. Learning Analytics and Data-Driven Decision Making

Learning analytics and data-driven decision making are central to modern education, as Learning analytics collects and analyzes data on student behavior, engagement, and performance to identify trends and guide teaching, as well data-driven decision making uses these insights to shape curriculum, instruction, and support services based on evidence. Together, they enhance personalized learning, improve outcomes, and support effective, informed educational practices.

6. Educators learning teams

Educators learning teams are collaborative groups of teachers who engage in reflective practice, knowledge sharing, and joint problem-solving to enhance instructional quality and student outcomes. These teams use student performance data, pedagogical research, and evidence-based strategies to guide decision-making, engage in peer observation, and co-develop effective teaching methods. By fostering a culture of continuous professional growth, collaboration, and accountability, educators learning teams promote innovation, teacher efficacy, and improved learning experiences within schools and educational networks.

7. Digital Learning Applications

Digital learning applications are smartphone-based tools that enhance teaching and learning by providing interactive content, personalized instruction, and immediate feedback. They often include multimedia resources, quizzes, and collaborative features that promote engagement, self-directed learning, and real-time interaction between educators and students. Supporting mobile learning paradigms, these

applications complement traditional instruction and foster flexible, learner-centered, and technology-driven educational experiences.

8. Societal engagement practicum

societal engagement practicum connects to global comparative education by giving students experiential opportunities to understand how education interacts with social, cultural, and economic contexts worldwide. By engaging in community initiatives, learners develop cross-cultural awareness and global competence, critically comparing local practices with international models. This approach enables the application of best practices from diverse contexts and equips students with skills to address global educational challenges, linking hands-on experience with the goals of comparative and internationally informed education.

9. Student Innovation and Enterprise Centres

Student innovation and enterprise centers are school-based spaces where students engage in creative problem-solving, entrepreneurial activities, and applied innovation projects. These centers provide mentorship, resources, and collaborative environments that foster critical thinking, practical skills, and innovative mindsets. Globally, such centers reflect best practices in education, promoting experiential learning, interdisciplinary collaboration, and employability skills. By adapting international models to local contexts, student innovation centers enable cross-cultural learning and prepare learners to address both local and global challenges effectively.

10. Inclusive and Equity-Focused Innovation

Designing strategies that ensure marginalized students, girls, and learners with disabilities can access global best practices promotes equitable education outcomes (Nwankwo, 2022).

11. Simulation-based Immersive Learning

Simulation-based immersive learning involves the use of digital simulations and virtual environments to recreate real educational settings and practices from different countries, enabling learners to actively engage with global education systems. As a strategy for adopting and improving comparative education, it allows students, teachers, and policymakers to experience and analyze international teaching methods, curricula, and assessment models in a practical way rather than relying only on theory. This approach supports informed adaptation of global best practices to local contexts by highlighting cultural, social, and institutional differences, while also promoting experiential, inquiry-based, and equitable learning opportunities, especially in contexts where physical international exposure is limited.

12. Artificial Intelligence (AI)-Enhanced Learning

Artificial intelligence–enhanced learning involves the use of AI-driven tools such as adaptive learning systems, intelligent tutoring platforms, and learning analytics to personalize instruction and improve educational outcomes. As a strategy for adopting and improving comparative education, it enables data-driven comparison of teaching methods, curricula, and student performance across different education systems, supporting evidence-based adaptation of global best practices to local contexts. By using predictive analytics and automated feedback, AI-enhanced learning promotes inclusive, scalable, and context-sensitive reforms, helping educators and policymakers make informed decisions that improve the effectiveness and sustainability of comparative education initiatives.

13. Open Learning Ecosystem

open learning ecosystem comprises a network of digital platforms, collaborative institutional arrangements, massive open online courses, and open educational resources that support flexible and inclusive learning. As a strategy for adopting and improving comparative education, it enables cross-national sharing of curricula, pedagogical practices, and research evidence, supporting informed and context-sensitive adaptation of global best practices. By reducing cost and access barriers, open learning ecosystems promote equity, scalability, and capacity building, allowing educators and policymakers to benchmark standards, encourage transnational collaboration, and strengthen sustainable comparative education reforms across diverse educational contexts.

14. Design Thinking in Education

Design thinking in education is a human-centered, iterative approach that emphasizes empathy, creativity, prototyping, and testing to improve learning experiences and outcomes. In strategies for adopting and improving comparative education, it allows educators and policymakers to critically engage with global best practices and adapt them to local contexts in a context-sensitive and innovative way. By focusing on learner-centered solutions, design thinking helps identify challenges unique to specific educational settings and develop tailored interventions. It also promotes collaborative policy development, innovative curriculum design, and participatory learning, ensuring that comparative education initiatives are adaptable, relevant, and sustainable while effectively integrating global educational innovations.

15. Peer-to-Peer and Student-Led Learning Models

The peer-to-peer student learning model is an instructional approach in which students actively engage in teaching and learning from one another, fostering collaborative knowledge construction rather than relying solely on teacher-led instruction. Grounded in social constructivism and Vygotsky's zone of proximal

development, this model emphasizes the co-construction of understanding, scaffolding, and dialogic interaction, allowing learners to enhance both cognitive and social skills. Globally, peer-to-peer learning has been recognized for improving student engagement, motivation, and the development of transferable competencies such as communication, collaboration, and self-regulation. In the context of global comparative education, adopting this model requires strategic alignment with national curricula, teacher preparation in facilitation and assessment, structured peer interaction, and culturally responsive practices. Moreover, integrating technology and inclusive strategies ensures accessibility across diverse contexts, making peer-to-peer learning a scalable and equitable approach for improving educational outcomes worldwide.

16. Integration of Sustainability and Global Citizenship Education

The integration of sustainability and global citizenship education involves embedding environmental, social, and ethical principles into curricula and learning experiences to cultivate responsible and engaged learners. Sustainability education emphasizes systems thinking, ecological literacy, and the skills needed to address complex global challenges, while global citizenship education fosters critical consciousness, ethical reasoning, and active participation in local and international communities. In global comparative education, effective adoption requires aligning these approaches with national policies, preparing teachers to facilitate experiential and project-based learning, and designing culturally responsive pedagogies that encourage collaboration and reflection. Leveraging digital platforms and transnational learning networks further supports cross-cultural dialogue and the development of competencies for navigating interconnected global systems. Through this integration, students are equipped to act as informed, reflective, and socially responsible citizens capable of addressing contemporary environmental and societal challenges.

Conclusion

Comparative education provides a critical lens for analyzing educational systems worldwide, enabling policymakers, educators, and researchers to identify effective practices, policies, and innovations that can enhance local school systems. The application of global best practices in education offers an avenue for improving teaching quality, curriculum relevance, assessment methods, and learning outcomes. By examining successful models from diverse contexts, comparative education highlights strategies that promote critical thinking, creativity, problem-solving, and lifelong learning among students. However, the mere adoption of international practices is insufficient; successful implementation requires contextual adaptation. Cultural, social, economic, and political realities significantly influence how global best practices can be integrated into local education systems. For instance, pedagogical approaches that thrive in one country may need modification to align

with local traditions, values, and resources. Additionally, challenges such as limited infrastructure, inadequate teacher training, resistance to change, and financial constraints must be addressed to ensure that global practices are meaningful, effective, and sustainable in local contexts.

Innovative strategies, including blended and hybrid learning, digital technologies, gamification, virtual exchange programs, adaptive curricula, AI-driven personalized learning, and professional learning communities, provide practical mechanisms for bridging the gap between global standards and local needs. When combined with equity-focused policies, inclusive education initiatives, and participatory stakeholder engagement, these strategies ensure that all learners, including marginalized and disadvantaged groups, benefit from global educational advancements. Furthermore, comparative education underscores the importance of continuous monitoring, evaluation, and knowledge sharing to refine educational practices over time. Schools that embrace reflective practices, data-driven decision-making, and innovation hubs are better positioned to adapt global insights to local realities effectively. Ultimately, the integration of global best practices through comparative education strengthens the capacity of local education systems to cultivate learners who are academically competent, socially responsible, culturally aware, and globally competitive.

In essence, comparative education is about strategic adaptation rather than wholesale replication. The thoughtful application of global best practices, grounded in local realities and supported by policy, technology, teacher capacity, and stakeholder engagement, can transform school systems. Such an approach equips students not only with academic competence but also with 21st-century skills, global awareness, and the resilience needed to navigate a rapidly changing world. By leveraging international insights creatively and responsively, local education systems can foster innovation, inclusivity, and excellence, preparing learners to become proactive contributors to both their communities and the global society.

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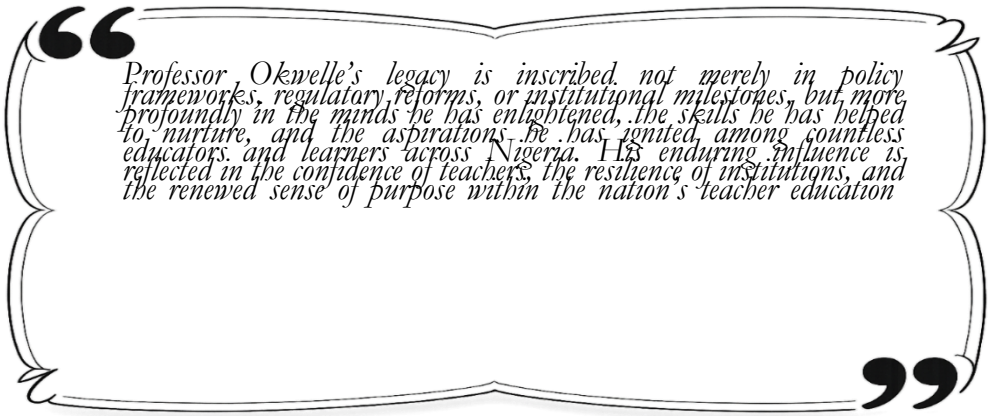
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Chapter 26

Impact Of Early Childhood Education on Delinquency Rates Among Primary School Pupils in Akwa Ibom State, Nigeria

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Abstract

This study examined the relationship between early childhood education and delinquency among primary school pupils in Akwa Ibom State, Nigeria. A survey research design was adopted for the study. The population comprised primary school pupils and teachers in Akwa Ibom State, from which a sample of 150 pupils and 50 teachers was selected using a simple random sampling technique. Data were collected using a researcher-developed questionnaire titled Early Childhood Education, Future Crime, and Delinquency questionnaire. The reliability of the instrument was established using Cronbach's Alpha, yielding a coefficient of 0.76. Data were analyzed using correlation statistics. The findings revealed a significant negative relationship between early childhood education and delinquency rates among primary school pupils, indicating that improved early childhood educational experiences are associated with lower levels of delinquent behavior. The results further showed a negative, though weak, relationship between delinquency and the likelihood of future criminal behavior. Based on these findings, the study recommends increased government funding for early childhood education, the implementation of evidence-based early childhood education programmes by school administrators, and continuous training of teachers and caregivers in child psychology and behavior management as effective strategies for reducing delinquency among children.

Keywords: *Early Childhood Education; Delinquency; Future Crime; Primary School Pupils; Teachers.*

Introduction

Early childhood education (ECE) refers to the intentional process of enabling learning and the acquisition of essential knowledge and skills related to health, nutrition, safety, security, responsive caregiving, and early learning experiences. These foundational elements are critical to the development of children's intellectual abilities, creativity, emotional stability, and overall well-being. Early childhood represents a crucial developmental stage spanning approximately the first eight years of life, during which rapid physical, cognitive, linguistic, and socio-emotional growth occurs (Joshi & Shukla, 2019). Experiences during this period significantly shape children's behavioural patterns, learning trajectories, and long-term life outcomes.

Scholarly attention has increasingly emphasized early childhood education as a strategic intervention for preventing antisocial behaviour and juvenile delinquency. Yoshikawa (1995), in a comprehensive review of criminological, psychological, and educational literature, argued that many crime prevention efforts focus on late childhood or adolescence, thereby missing a critical opportunity for early intervention. The study identified key early childhood risk factors associated with later delinquent behaviour and demonstrated that well-designed early childhood programmes, particularly those combining intensive family support with early education can significantly reduce future antisocial and delinquent outcomes. Such programmes were also found to be cost-effective and capable of mitigating broader social risks linked to poverty and environmental disadvantage.

Similarly, Zigler et al. (1992) observed that conventional delinquency prevention programmes often fail because the roots of juvenile delinquency are embedded across multiple systems, including the individual child, the family, and the wider community. Their longitudinal findings revealed that comprehensive early childhood intervention programmes, which adopt an ecological approach to child development, have the potential to reduce later delinquent behaviour. These programmes enhance overall social competence, with avoidance of criminal behaviour emerging as one indicator of broader developmental success, including academic achievement and healthy interpersonal relationships.

In the context of Akwa Ibom State, early childhood education functions as a critical preventive mechanism against crime by fostering positive learning environments that encourage prosocial attitudes, emotional regulation, and resilience among children. This role is particularly important given the prevailing socio-economic challenges within the state. García et al. (2019) maintain that high-quality early childhood education reduces crime by improving home environments, especially for disadvantaged children and girls, who are often most vulnerable to adverse developmental conditions. Early investment in children enhances critical thinking,

social competence, and emotional intelligence, thereby laying the foundation for peaceful and socially cohesive communities.

Teachers play a central role in realizing the preventive potential of early childhood education. Baig and Begum (2023) emphasize that teachers significantly influence young children's value formation through role modelling, daily instructional practices, and sustained interactions with parents. Through these mechanisms, early childhood educators contribute not only to academic development but also to moral socialization and behavioural regulation, making ECE an essential component of broader crime prevention strategies.

Delinquency, as a concept, generally refers to behaviour that deviates from societal norms and violates legal standards, particularly when committed by minors. Mazumdar (2022) describes delinquency as aberrant conduct prohibited by law and socially condemned, while Kaganovska and Slinko (2021) conceptualize it as a unified construct encompassing criminal offences and misconduct defined by both social and legal sciences. The increasing prevalence of juvenile delinquency and anti-social behaviors in Akwa Ibom State underscores the urgency of examining the role of early childhood education in shaping behavioural outcomes. Consequently, this study seeks to investigate the impact of early childhood education on delinquency rates among primary school pupils in Akwa Ibom State, Nigeria.

Statement of the Problem

The absence or inadequacy of quality early childhood education in Akwa Ibom State has been increasingly associated with rising levels of delinquent behaviour among primary school pupils. This situation poses serious concerns, as early childhood education plays a critical role in laying the cognitive, moral, emotional, and social foundations necessary for positive academic engagement and responsible behaviour. When children lack access to structured and developmentally appropriate early learning experiences, they are more vulnerable to behavioural challenges that negatively affect their academic performance, peer relationships, and long-term life outcomes.

Despite the recognized importance of early childhood education in shaping children's developmental trajectories, many families in Akwa Ibom State remain insufficiently aware of the need for quality early childhood education. This limited awareness persists even in the presence of relatively affordable early education opportunities within the state. As a result, some children enter primary school without the necessary socialization, discipline, and learning readiness, thereby increasing their susceptibility to delinquent behaviours within the school environment.

The persistence of delinquency among these primary school pupils, suggests that factors beyond formal schooling at later stages may be contributing to the problem, underscoring the need to examine early developmental influences. Consequently, this

study seeks to examine the relationship between early childhood education and delinquency among primary school pupils in Akwa Ibom State, Nigeria, with the aim of generating empirical evidence to inform educational policy, parental awareness, and early intervention strategies.

Objectives of the Study

The main objective of this study is to examine the relationship between early childhood education and delinquency rates in primary schools in Akwa Ibom State. Specifically, the study seeks to:

1. Examine the relationship between early childhood education and delinquency rates among pupils in primary schools in Akwa Ibom State.
2. Determine the relationship between the likelihood of future criminal behavior and delinquency rates among pupils in primary schools in Akwa Ibom State.

Research Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance:

1. There is no significant relationship between early childhood education and delinquency rates among pupils in primary schools in Akwa Ibom State.
2. There is no significant relationship between the likelihood of future criminal behaviour and delinquency rates among pupils in primary schools in Akwa Ibom State.

Literature Review

Early Childhood and Education:

Early Childhood Care, Development and Education (ECCDE) occupy a central position in human development and educational planning. The National Policy on Education defines ECCDE as the care, protection, stimulation, and learning provided to children aged 0–4 years in crèches and nursery schools (Aguh & Olutola, 2022). In alignment with this policy, the Universal Basic Education (UBE) guidelines link pre-primary classes to public primary schools for children approximately aged 3–5 years, with the objective of preparing them for entry into Primary One (Sooter, 2013; Oluwafemi et al., 2014).

Nigerian scholars have offered broader conceptualizations of early childhood education. According to Owojori and Gbenga-Akanmu (2021) as well as Aguh and Olutola (2022), early childhood education encompasses formal and informal care and learning experiences from conception or birth up to about 6-8 years of age. This stage of education is aimed at promoting children's cognitive, social, emotional, language, and motor development. Similarly, researchers conceptualize early childhood

education as organized learning experiences from birth through the early school years that support holistic child development, extending beyond purely academic instruction to include social, emotional, and physical competencies (Kumar, 2025; Mohammad, 2024).

Osegbue (2025) provided a comprehensive theoretical analysis of early childhood education in Nigeria, focusing on its challenges and prospects. The study conceptualized education as a lifelong process that begins at birth and continues throughout the life span. It emphasized that the early years represent a critical period of rapid growth and development. Early Childhood Education (ECE), also referred to as nursery education, was described as a branch of educational theory concerned with the formal and informal teaching of children up to approximately eight years of age. According to the study, ECE forms the foundation for children's social skills, self-esteem, moral orientation, worldview, and cognitive development.

The objectives of early childhood education identified by Osegbue (2025) include facilitating a smooth transition from home to school, preparing children for primary education, providing adequate care and supervision while parents are at work, and inculcating acceptable social norms. Other objectives include fostering creativity and curiosity through interaction with nature, art, music, and play; developing cooperation and team spirit; promoting good health habits; and teaching basic numeracy, literacy, colours, shapes, and forms through play-based learning. The study also discussed the benefits of early childhood education, as well as the challenges confronting its effective implementation in Nigeria, and proposed strategies for improvement.

Similarly, Jimoh et al. (2025) emphasized that early childhood education serves as the foundation for lifelong learning, with significant implications for children's cognitive, social, and emotional development. Their study identified major challenges undermining the effectiveness of ECE in Nigeria, including curriculum gaps, inadequate teacher training, weak policy implementation, and socioeconomic barriers. Using a qualitative research approach, the study employed document analysis, semi-structured interviews, and classroom observations to assess curriculum structure, teacher preparedness, and policy enforcement. Findings revealed that Nigeria's ECE curriculum lacks adequate play-based learning, STEM integration, and social-emotional development frameworks, rendering it outdated and ineffective in preparing children for sustainable learning.

Additionally, Jimoh et al. (2025) found that over 70% of early childhood educators lack specialized professional training, resulting in heavy reliance on rote memorization rather than interactive and child-centred learning methods. Despite existing policy frameworks, persistent underfunding and poor enforcement limit access to quality early childhood education, particularly in rural areas. The study recommended comprehensive curriculum reforms, enhanced teacher training,

increased funding, and stronger policy implementation as critical steps toward improving early childhood education in Nigeria. These measures were identified as essential for achieving Sustainable Development Goal 4 (Quality Education) and for nurturing a future-ready generation.

Delinquency

In Nigerian law and juvenile justice practice, delinquency is defined primarily by the age of the offender rather than the nature of the act. Offences committed by children and young persons generally those under the age of 18, are classified as juvenile delinquency, whereas similar acts committed by adults are treated as crimes (Sa'ad, 2008). This age-based distinction reflects the legal recognition of children's developmental status and the emphasis on rehabilitation rather than punishment within the juvenile justice system.

Scholars commonly define juvenile delinquency as the commission of illegal, antisocial, or deviant acts by minors that would constitute crimes if perpetrated by adults, as well as *status offences* such as truancy, running away from home, and disobedience to parental authority (Esiri & Ejechi, 2021; Folorunsho et al., 2024). These definitions highlight the broader scope of delinquency, encompassing both criminal behaviours and conduct that violates social or legal norms specific to children.

Empirical studies in Nigeria emphasize the strong influence of sociocultural and environmental factors on childhood delinquency. Iyiola et al. (2025) examined social-cultural interpretations and contributing factors to delinquent behaviour among children in slum communities within the Ibadan metropolis, specifically Beere, Orita-Merin, and Eleta. Using a narrative research design, the study engaged parents and community leaders through multistage purposive sampling, with data analysed thematically. The findings revealed diverse interpretations of delinquent behaviour, with major contributing factors including family background, peer influence, environmental conditions, and economic hardship. The study concluded that childhood delinquency is largely shaped by the sociocultural environment, with important implications for how society perceives and responds to juvenile deviance, particularly in economically disadvantaged urban communities.

Similarly, Oseghale (2025) examined trends and regional variations in juvenile delinquency across Nigeria through a comparative analysis of Lagos State and other states, including Kano, Rivers, Anambra, and Borno. The study found that juvenile delinquency in Nigeria exhibits distinct regional patterns influenced by varying socio-economic and cultural contexts. While urbanization and population density contribute to higher levels of gang-related crimes in Lagos State, economic hardship was identified as a major driver of youth crime in Kano and Rivers States. In Anambra State, financial fraud and cyber-related offences were more prevalent. The

study further noted variations in the effectiveness of intervention programmes and law enforcement responses across regions. The findings underscore the need for a unified national strategy for juvenile crime prevention that incorporates region-specific interventions addressing local socio-economic realities, cultural influences, and rehabilitation support systems.

Akinwale and Ojakorotu (2025) further explored the causes and implications of juvenile delinquency in South-West Nigeria, focusing on the mediating roles of poverty, peer pressure, and drug abuse. Employing a qualitative research design, the study involved ten adolescents residing in a correctional home. The findings revealed that poverty significantly increases adolescents' vulnerability to delinquent activities, often through exposure to negative peer influence and substance abuse. Drug use was found to impair judgment, making adolescents more susceptible to delinquent behaviour. The study also highlighted the developmental consequences of delinquency, including disrupted education, strained family relationships, and long-term psychological effects. The authors recommended interventions such as compulsory education, poverty reduction initiatives, and the promotion of inclusive community structures to reduce juvenile delinquency and safeguard the future of Nigerian youth.

Collectively, these studies demonstrate that juvenile delinquency in Nigeria is a multifaceted phenomenon shaped by legal definitions, socio-economic conditions, family dynamics, peer influence, and broader cultural and environmental contexts. Addressing juvenile delinquency therefore requires comprehensive, community-based, and policy-driven approaches that prioritize prevention, social support, and rehabilitation.

The Link between Early Childhood Education and Child Delinquency

A growing body of empirical literature establishes a strong connection between early childhood education, family socialization, and the prevention of child and juvenile delinquency. Studies indicate that quality family education and school-based moral instruction, characterized by positive teacher–student relationships, democratic learning environments, and structured moral education significantly reduce the risk of juvenile delinquency (Zhang, 2023). Supporting this view, Zazkia (2022) observed that family education alone accounts for a 19.4% reduction in juvenile delinquency, underscoring the central role of parental guidance and early socialization.

Beyond behavioural outcomes, early childhood education yields substantial long-term benefits. McCoy et al. (2017) demonstrated that participation in early childhood education significantly reduces special education placement and grade retention while increasing high school graduation rates. These outcomes highlight the role of early education in promoting child well-being and reducing long-term educational and social costs.

In the Nigerian context, pre-primary education has been shown to contribute meaningfully to children's social, emotional, and cognitive development, although its current implementation falls short of global standards and expectations (Ighalo, 2015). Ikiyie et al. (2022) further noted that the high population of out-of-school children in Nigeria contributes to national stagnation and insecurity, with poverty, ignorance, insecurity, corruption, and materialism identified as major exclusionary factors. Similarly, Ward et al. (2020) argued that delinquency and youth arrest are closely associated with early school leaving, particularly when involvement in crime begins at younger ages.

Evidence also suggests that the relationship between early childhood education and delinquency is complex. While universal early childhood education and care (ECEC) produce mixed outcomes, high-quality programmes consistently generate positive developmental and behavioural effects (Van Huizen & Plantenga, 2018). Family education, school education, and a supportive social environment collectively reduce delinquency risk (Zhang, 2023), particularly in contexts where illiteracy and poverty exacerbate juvenile deviance (Razi, 2015). Early childhood education and care for children under three years of age provide a crucial foundation for healthy development and lifelong learning (Mathers & Ereky-Stevens, 2018). During these formative years, targeted interventions can significantly alter life trajectories, promote positive outcomes and reduce the likelihood of delinquency (Farrington et al., 2017; Reynolds & Ou, 2016).

Peer influence also plays a critical moderating role in childhood delinquency. Fite et al. (2012) examined the effects of contextual risk factors such as negative life events and neighbourhood problems alongside perceived best-friend delinquency among a community sample of school-aged children. Their findings revealed that perceived best-friend delinquency moderated the relationship between contextual risk factors and self-reported delinquency, although the magnitude of this effect depended on the specific contextual risks involved. This underscores the importance of peer networks in shaping delinquent behaviour, even among younger children.

Beyond educational factors, adverse childhood experiences further compound delinquency risk. Olorunlambe and Adeniyi (2025) examined the relationship between child maltreatment and disruptive behaviour disorders among adolescents in juvenile detention and out-of-home placements in Southwest Nigeria. Their findings revealed that physical abuse, substance abuse, and male gender were significantly associated with conduct disorder, while witnessing violence was linked to oppositional defiant disorder. Importantly, resilience and emotion regulation were found to mediate these relationships, suggesting that early psychosocial interventions can mitigate the long-term behavioural consequences of maltreatment.

Educational interventions within correctional settings also demonstrate rehabilitative potential. Fashiku (2022), in a study of juvenile homes in Lagos State, found that

educational programmes including academic instruction, counselling, and vocational training had a significant positive influence on the rehabilitation of juvenile offenders. The study concluded that structured educational programmes play a vital role in reducing recidivism and facilitating reintegration, recommending the inclusion of literacy and life-skills training, improved infrastructure, and appropriate classification of juvenile residents.

Overall, the literature demonstrates that early childhood education, family structure, peer influence, socio-economic conditions, and exposure to maltreatment interact to shape the developmental pathways leading to delinquency. Preventive strategies must therefore adopt a holistic approach that strengthens early education systems, supports families, addresses poverty and social exclusion, and provides targeted psychosocial interventions to reduce the risk of child and juvenile delinquency.

Biblical and Quranic Perspectives on Child Training

Two of the world's major religious texts, the Bible and the Qur'an, provide invaluable guidance on child training, offering moral and educational principles that transcend generations. Both scriptures emphasize the importance of early education, discipline, and moral instruction as foundational elements for nurturing responsible citizens and promoting social stability.

In Akwa Ibom State, where Christianity is predominantly practiced, biblical teachings place strong emphasis on early child training as a means of building safer communities and securing a bright future for children. Proverbs 22:6 underscores the long-term impact of early moral guidance, stating, *"Train up a child in the way he should go, and when he is old, he will not depart from it."* This passage highlights how formative upbringing shapes character and life choices. Similarly, Ephesians 6:4 cautions against harsh or provoking parenting, advising that *"Fathers, should not provoke your children to anger, but bring them up in the discipline and instruction of the Lord."* This verse emphasizes a balanced approach to parenting that combines discipline with care, patience, and moral instruction.

Parenting, therefore, is presented as a fundamental responsibility that requires intentional nurturing, guidance, and education. This responsibility transcends cultural and religious boundaries, reflecting the universal importance of instilling moral values, compassion, self-control, and social responsibility in children for their overall well-being.

The Qur'an also reinforces the centrality of education and knowledge acquisition for child and human development. The first word revealed to Prophet Muhammad was *"Iqra"* ("Read"), symbolizing the primacy of learning, literacy, and intellectual growth in Islam. This directive underscores that the cultivation of the mind is as important as the cultivation of the soul. Surah Al-Mulk (67:15) further emphasizes humanity's duty to seek knowledge and understand the world: *"It is He who made*

the earth manageable for you, so traverse its paths and partake of the sustenance He has provided." Within this spiritual framework, education is encouraged for all ages as a means of deepening faith, understanding social realities, and engaging responsibly with society.

Empirical studies underscore the intersection of religion, education, and child development. For instance, Ozobuwa (2021) investigated the relationship between religion and school enrolment of girls in Northern Nigeria. This quantitative study focused on stakeholders concerned with persistently low enrolment of girls, particularly examining how religious, cultural, economic, and policy factors influence access to education. Guided by Adam Smith's Human Capital Development Theory, the study found a significant relationship between education and five variables religion, culture, poverty, violence, and poor policy implementation that hinder girls' school enrolment. The findings provide a basis for developing strategies to improve educational access for girls in Northern Nigeria.

Similarly, Soneye, et, al, (2025) examined leadership and academic excellence in Christian Religious Studies Education at Caleb University. Using qualitative methods, including interviews and focus group discussions with students, faculty, and administrative staff, the study highlighted the positive influence of Christian Religious Studies on academic success, ethical leadership, and community engagement. The research demonstrated that the leadership of scholars such as Soneye, et, al, (2025) fostered a supportive academic environment and scholarship programs, alleviating financial burdens and promoting student achievement. Moreover, the study emphasized the integration of ethical reasoning and community outreach within the curriculum, preparing students to address societal challenges responsibly. The authors concluded that Christian religious studies education is a vital force for personal growth and social responsibility, encouraging policymakers, educators, and students to recognize its transformative potential.

In conclusion, both biblical and Quranic perspectives, reinforced by empirical research, affirm the critical role of early moral, spiritual, and academic guidance in shaping children's development. Early education supported by family, religious, and institutional structures—serves as a powerful foundation for cultivating responsible, informed, and socially engaged citizens.

Neglectful Parenting and Criminal Family Backgrounds

Environmental factors, particularly family dynamics, play a critical role in shaping the development and behavior of children. Among these, neglectful parenting and criminal family backgrounds are strongly associated with an increased risk of delinquency in childhood and adolescence.

Neglect is defined as the failure to provide for a child's basic needs or to protect them, with severity depending on the frequency of neglect, the harm caused, and the

child's age and vulnerability (Fallon et al., 2020). Emotional neglect, in particular, involves repeated caregiver-child interactions characterized by emotional unavailability, withdrawal, lack of reciprocity, or disengagement, which can cause children to feel worthless, unloved, or unwanted (Mobayed, 2016). Neglectful parenting is often linked to functional difficulties later in life, including cognitive impairments, psychopathology, and reduced interpersonal skills (Sciarrino, Hernandez, & Davidtz, 2018).

In Nigeria, neglect and inadequate parental supervision have been shown to contribute significantly to juvenile delinquency. Gomment (2016) highlighted that parental neglect and polygamy among *almajirai* in Northern Nigeria increased the risk of antisocial behaviors, emphasizing the need to address and criminalize these practices. Similarly, Atilola, et, al, (2014) observed that adolescent boys labelled as "beyond parental control" often exhibited higher rates of behavioral problems, child abuse, and family disruption, suggesting that neglect was already present before the formal designation. Sokol et al. (2021) further noted that parental failure to supervise children often in households affected by domestic violence or substance abuse was the most prevalent form of maltreatment, appearing in 71% of substantiated child welfare cases.

Exposure to criminal behavior within the family is another critical factor shaping delinquency. Kroese, et, al, (2020) found that growing up in single-parent families increased adolescents' risk of engaging in crime, regardless of the family type. TenEyck, Knox, and Sayed (2021) emphasized that the absence of a biological father at different stages of a child's life is linked to varying outcomes: absence before birth correlates with criminal behavior in adulthood, absence during early childhood predicts early adult criminality, and absence in late adolescence is associated with higher risk of arrest.

Having a parent involved in criminal activities also elevates the risk of delinquency. Ruhland, et, al, (2020) reported that adolescents with a currently or formerly incarcerated parent exhibited significantly more externalizing behaviors, making them more prone to delinquency and high-risk conduct. Exposure to crime, normalization of illegal behavior within the family, and inherited socioeconomic disadvantages combine to create an environment where criminal acts may be perceived as acceptable strategies for survival or coping. Indeed, neglectful parenting and criminal family environments interact to create high-risk developmental contexts for children.

Emotional neglect, inadequate supervision, and exposure to parental criminality or family dysfunction contribute to antisocial behavior and increase the likelihood of juvenile delinquency. Interventions that address family dysfunction, provide support to at-risk parents, and foster safe, nurturing environments are critical to preventing delinquency and promoting healthy child development.

Children in Socially Disorganized and Crime-Prone Areas

Social disorganization theory provides a useful framework for understanding how neighborhood structural conditions influence crime, delinquency, and child maltreatment. Social disorganization refers to the breakdown of social control within a community, resulting in weakened social cohesion, imbalance in social order, and diminished adherence to shared norms and values (Kubrin & Wo, 2015; Maloku, 2021). Core elements of the theory include residential instability, poverty, family disruption, and ethnic or racial heterogeneity, all of which undermine collective efficacy and increase vulnerability to crime.

Empirical evidence demonstrates that social disorganization theory is applicable not only in urban contexts but also in rural settings. Moore and Sween (2015), in their re-examination of rural youth crime in the United States, tested the applicability of social disorganization theory using juvenile arrest data from 2,011 nonmetropolitan counties across 48 states. Their findings revealed that residential mobility, family disruption, ethnic heterogeneity, poverty, and population density significantly predicted higher levels of youth crime in rural areas. Contrary to conventional assumptions, age was not significantly associated with crime in rural contexts, and unemployment rates showed no significant effect. These findings align with earlier work by Osgood and Chambers (2000), reinforcing the relevance of social disorganization theory in explaining juvenile delinquency beyond urban environments.

Similarly, Maguire-Jack et al. (2024) examined the appropriateness of social disorganization theory in understanding rural child maltreatment using administrative child welfare data from the state of Michigan. Employing principal component analysis, spatial analysis, and negative binomial regression, the study found that neighborhood economic disadvantage, residential instability, and childcare burden were significantly associated with higher rates of child maltreatment in both metropolitan and nonmetropolitan census tracts. However, the study also identified contextual differences between rural and urban areas, such as the influence of seasonal housing and racial composition, suggesting that while social disorganization processes are present in rural communities, they may operate in distinct ways.

Living in socially disorganized or crime-prone neighborhoods has profound implications for children's behavioral and psychosocial development. Ramey and Harrington (2019) found that exposure to high-crime neighborhoods is associated with increased internalizing and externalizing behavioral problems among preschool-aged children. Children raised in such environments are frequently exposed to violence, substance abuse, delinquency, and gang activities, which may normalize aggression and other maladaptive behaviors. Over time, these experiences shape children's perceptions of their future, often fostering feelings of entrapment,

hopelessness, truancy, and eventual involvement in criminal subcultures, thereby perpetuating intergenerational cycles of poverty and crime.

Evidence from sub-Saharan Africa further supports the applicability of social disorganization theory across diverse sociocultural contexts. Opoku-Ware et al. (2021), drawing on survey data from two urbanized communities in Ghana, modelled the effects of residential instability, family disruption, and social support on neighborhood crime perceptions using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings indicated that residential instability and family disruption significantly weakened community-level social support. Although social support was expected to function as an informal social control mechanism, it paradoxically exhibited a positive relationship with perceived neighborhood crime, raising important questions about the contextual effectiveness of social support in socially disorganized environments.

Overall, these studies collectively demonstrate that children growing up in socially disorganized and crime-prone neighborhoods, whether urban or rural, face heightened risks of delinquency, maltreatment, and adverse developmental outcomes. The evidence underscores the need for place-based interventions that strengthen family structures, enhance social cohesion, improve neighborhood stability, and address structural inequalities that sustain cycles of crime and child vulnerability.

Overcrowded Classrooms, Corrupt Teachers, and Poor Pay in Education

The rapid expansion of access to education, particularly at the secondary level, has often outpaced the provision of adequate infrastructure and human resources. Yalley, et, al, (2023) observed that the increase in student enrolment in Ghana has contradicted the recommended teacher-student ratio of 1:40, resulting in overcrowded classrooms, overworked teachers, and insufficient learning materials. These conditions reduce individualized attention, hinder student engagement, and lower motivation, ultimately affecting learning outcomes. The study highlighted how senior high school social studies teachers use self-efficacy beliefs and innovative teaching strategies to mitigate the challenges posed by large class sizes.

Similarly, Maundu, et al. (2025) examined the effect of high student-teacher ratios on mathematics performance in public secondary schools in Nzaui Sub-County, Kenya. The study found that half of the students attended mathematics classes with over 50 learners, which negatively impacted performance ($r = .466$, $p < .05$). Teachers reported reliance on lecture methods, limited individual attention, and a focus on “crowd control” rather than effective pedagogy. These findings underscore the systemic barriers posed by inadequate infrastructure and insufficient teaching staff, especially in rural areas, emphasizing the need for strategic policy interventions.

Corruption and poor remuneration in the education sector further exacerbate these challenges. Joseph et al. (2021) noted that poverty, low teacher pay, and moral lapses among educators contribute to absenteeism and poor classroom engagement. Ugoani (2016) and Isenström (2020) argue that negative teacher attitudes, often linked to low pay, can have long-term psychological effects on students, including depression and feelings of inferiority (Louw & Beyers, 2023; Han, 2018). Whawo (2015) also emphasizes that corruption in schools, driven by poor income, unemployment, and bribery, undermines educational quality.

In the context of early childhood education (ECE) in Nigeria, Olatunji, et, al, (2024) investigated economic factors contributing to teacher shortages in Ibadan South-West. Using a descriptive survey design and the Job Demands-Resources (JD-R) model, the study found that low salaries, high living costs, job insecurity, and inadequate professional development significantly contribute to teacher attrition. Distinctions between public and private ECE teachers revealed unique challenges affecting retention and teaching quality. The study recommended increasing salaries, providing financial incentives, expanding professional development, offering housing support, and establishing mentorship programs to enhance teacher retention and the overall quality of ECE.

Collectively, these studies highlight that overcrowded classrooms, poor teacher pay, and systemic corruption are interrelated challenges that undermine effective teaching and learning. Addressing these issues requires comprehensive policy reforms, investment in infrastructure, fair teacher compensation, and the promotion of professional development to improve educational outcomes and foster student well-being.

Theoretical Framework

Social Control Theory

Social Control Theory emphasises the social forces that restrain individuals from engaging in criminal or delinquent behavior. According to Costello (2017), these forces include attachment to parents and significant others, commitment to conventional goals, involvement in socially approved activities, and belief in the moral legitimacy of societal rules and laws. Britt (2015) further argues that strong social bonds with key institutions such as the family, school, and community reduce the likelihood of delinquency by increasing the perceived costs of deviant behaviour and reinforcing conformity to social norms.

Within this framework, early childhood education plays a crucial preventive role by fostering positive relationships between children and adult caregivers, teachers, and peers. Through structured learning environments, children are introduced to societal values, norms, and expectations, while developing a sense of right and wrong. Schools, particularly at the early childhood level, function as agents of social control

by encouraging conformity through moral instruction, positive reinforcement, informal sanctions (such as praise or disapproval), and formal disciplinary measures (Marken, 2021). Consequently, children who experience quality early childhood education are more likely to internalise social norms, thereby reducing their propensity for delinquent behaviour later in life.

Developmental and Life-Course Criminology

Developmental and life-course criminology focuses on how antisocial behaviour and offending patterns change over time, drawing largely on longitudinal research designs (McGee et al., 2020). This perspective examines the origins, progression, persistence, and desistance of offending in relation to key developmental stages and life-course transitions (Mazerolle & McGee, 2017). Kazemian, et, al, (2018) emphasise that this approach pays particular attention to individual, psychological, and social factors that shape behaviour from early childhood through adulthood.

From this theoretical standpoint, high-quality early childhood education provides a stable and nurturing environment that supports healthy cognitive, emotional, and social development. Such environments can mitigate the effects of adverse childhood experiences by promoting resilience, self-regulation, and pro-social behaviour. Early interventions during this formative period are therefore critical, as they can alter developmental pathways that might otherwise lead to persistent delinquency or criminal behaviour across the life course.

Results

Hypothesis 1: There is no significant relationship between early childhood education and delinquency in primary schools in Akwa Ibom State.

Table 1: Correlation of the relationship between early childhood education and delinquency in primary schools (n=200)

Variable	Mean	SD	R	P-value
Early Childhood Education	32.29	4.92		
			-0.159	0.25
Delinquency in Primary Schools	27.54	3.61		

Significant at a significance level of 0.05

Results in Table 1 show that there are a low negative and statistically non-significant relationship between early childhood education and delinquency among primary school pupils in Akwa Ibom State *($r = -0.159$, $p = 0.25$)*. This finding indicates that early childhood education does not have a statistically significant relationship with

delinquency in primary schools in Akwa Ibom State. Consequently, the null hypothesis was retained at the 0.05 level of significance.

Hypothesis 2: There is no significant relationship between the likelihood of future crime and delinquency in primary schools in Akwa Ibom State.

Table 2: Correlation of the relationship between likelihood of future crime and delinquency in primary schools (n=150)

Variable	Mean	SD	R	P-value
The likelihood of future crime	31.35	5.98		
			-0.338	0.00
Delinquency in Primary schools	27.54	3.61		

Significant at a significance level of 0.05

Results in Table 2 show that there is a moderate positive and statistically significant relationship between the likelihood of future crime and delinquency *(r = 0.338, p = 0.00)*. This indicates that as delinquent behaviour increases, the likelihood of future criminal involvement also increases among the respondents. Therefore, there is a significant relationship between delinquency and the likelihood of future crime. Consequently, the null hypothesis was rejected at the 0.05 level of significance.

Discussion

The findings of this study on the relationship between early childhood education and delinquency in primary schools in Akwa Ibom State revealed a low negative and non-significant relationship. This suggests that while early childhood education may have some influence on children's behaviour, it is not a decisive factor in explaining delinquency among primary school pupils in the study area. The implication is that other social and familial factors play more substantial roles in shaping delinquent behaviour among children.

Historically, prior to the advent of Western education, children were primarily socialized within the family and community setting, learning values and norms from parents and elders. Where parents possessed strong moral standards, such values were often transmitted to their children. However, factors such as parental neglect, family instability, and polygamous family structures have been identified as contributors to childhood delinquency. The findings of this study align with Adegoke (2015), who identified broken homes, poverty, and peer influence as major sustaining factors of juvenile delinquency in Nigeria.

Furthermore, the findings are consistent with McCoy et al. (2017), who reported that early childhood education significantly reduces special education placement and

grade retention while increasing high school graduation rates. This supports the broader utility of early childhood education in enhancing child well-being and reducing education-related challenges. However, the present findings contrast with those of Ward et al. (2020), who found that delinquency and youth arrests are strongly associated with early school leaving, particularly when criminal involvement begins at a younger age.

With respect to the relationship between delinquency and the likelihood of future criminal behaviour among primary school pupils in Akwa Ibom State, the findings revealed a low negative but statistically significant relationship. This indicates that early delinquent behaviour, although modest in magnitude, may serve as a precursor to future criminal involvement. These findings are consistent with Kroese et al. (2020), who reported that adolescents raised in single-parent families exhibit an elevated risk of criminal involvement, regardless of the type of single-parent household.

The findings also align with TenEyck et al. (2021), who observed that the absence of a biological father at different developmental stages is associated with varying forms of criminal behaviour later in life. Specifically, father absence before birth is linked to criminal behaviour in adulthood, early childhood absence to early adult criminal conduct, and late adolescence absence to arrest outcomes.

Additionally, this study supports the findings of Ruhland et al. (2020), who reported that children with currently or formerly incarcerated parents exhibit significantly higher levels of externalizing behaviours, thereby increasing their risk of delinquency and other high-risk behaviours. Exposure to criminal behaviour, normalization of illegal activities within the family, and persistent socioeconomic disadvantage collectively create environments in which future criminal acts may appear to be acceptable coping or survival strategies.

Conclusion

Based on the findings of this study, it was concluded that there are a low negative and non-significant relationship between early childhood education and delinquency among primary school pupils in Akwa Ibom State. This outcome suggests that delinquent behaviour among children is influenced more strongly by familial, social, and environmental factors than by the mere presence or absence of early childhood education.

In addition, the study established a low negative but significant relationship between delinquency and the likelihood of future criminal behaviour among primary school children in Akwa Ibom State. This finding underscores the importance of early identification and intervention in childhood delinquent behaviours, as such behaviours may serve as early indicators of later criminal involvement.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Policymakers should increase funding for early childhood education to improve access, quality, and learning outcomes. In addition, parents should actively monitor and participate in their children's educational development rather than merely enrolling them because education is free. Sustained parental involvement is essential throughout the early learning process.
2. School administrators should adopt and implement evidence-based early childhood education programmes that are developmentally appropriate and holistic. Instructional activities should go beyond routine or unstructured engagements (school farming) and be supported by structured curricula, adequate learning materials, and continuous professional training for staff.
3. Government authorities should prioritize the retraining and continuous professional development of classroom teachers, with particular emphasis on child psychology, early childhood development, and behavior management skills. This will enhance teachers' capacity to identify, manage, and prevent early signs of delinquent behavior among pupils.
4. Educators, (Ministry of Education) and other policymakers should regularly review and refine existing educational and child development policies, strengthen school-based support services, and promote community and stakeholder engagement as part of a comprehensive strategy for delinquency prevention in primary schools.

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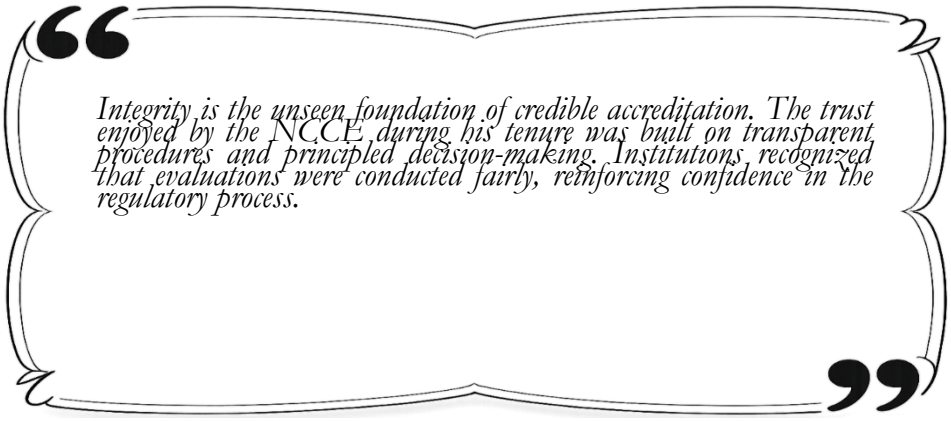
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Chapter 27

Information And Communication Technology (ICT) Integration in Teacher Education Programmes in Nigeria: Challenges and Prospects

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&

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Abstract

The integration of Information and Communication Technology (ICT) in teacher education is increasingly recognized as a strategic imperative for enhancing instructional quality and preparing educators for the demands of the 21st century. This paper critically examines the adoption and application of ICT within teacher education programmes in Nigeria, situating the discussion within relevant theoretical frameworks and global best practices. It identifies persistent challenges that impede effective ICT integration, including infrastructural inadequacies, limited ICT competence among teacher educators and trainees, and gaps in policy implementation. Drawing upon both empirical and conceptual literature, the study highlights the transformative potential of ICT in promoting innovative pedagogy, facilitating learner-centered instruction, and contributing to national educational development. The paper concludes with actionable recommendations for policymakers, teacher education institutions, and stakeholders to strengthen ICT adoption, enhance teacher preparedness, and cultivate digitally literate educators equipped to navigate the evolving landscape of education.

Keywords: *ICT integration, Teacher education, Digital pedagogy, ICT competence, Teacher preparedness, Instructional innovation*

Introduction

The rapid advancement of Information and Communication Technology (ICT) has profoundly transformed educational landscapes worldwide, redefining how teaching, learning, and educational management are conceptualised and implemented in the 21st century. The pervasive influence of ICT extends far beyond mere access to computers and digital tools; it encompasses the integration of sophisticated software applications, networking resources, multimedia platforms, virtual learning environments, and digital repositories that collectively facilitate the creation, organisation, dissemination, and management of knowledge. These technological innovations have become indispensable components of modern curricula, enabling dynamic, interactive, and learner-centered approaches that enhance both teaching and learning outcomes in diverse educational contexts. Research consistently underscores that when ICT is meaningfully integrated into educational practices, it fosters improved instructional delivery, personalised learning, access to global resources, and enhanced student engagement (Mishra & Koehler, 2006; Tino, 2003).

In the Nigerian context, the integration of ICT within teacher education programmes assumes critical importance as the nation strives to align its educational system with global standards and prepare educators for the technology-rich classrooms of the future. Teacher education in Nigeria plays a pivotal role in equipping both pre-service and in-service teachers with the competencies necessary to navigate evolving digital environments, implement innovative pedagogical strategies, and engage in continuous professional development. By leveraging ICT, teachers are positioned to foster essential 21st-century skills among learners, including critical thinking, problem-solving, creativity, and digital literacy, which are indispensable in an increasingly knowledge-driven global economy. Moreover, ICT integration supports lifelong learning paradigms, enabling educators to remain responsive to emerging technological trends, pedagogical innovations, and shifting societal needs.

Nigeria's National Policy on Education (NPE) has explicitly recognised the transformative potential of ICT and underscores its inclusion in teacher education curricula. The policy articulates the need for teachers to be adequately prepared to integrate technology meaningfully into instructional practices and operate effectively within digitised classroom environments. It also highlights the importance of providing teacher educators and trainees with access to technological infrastructure, continuous training, and appropriate pedagogical frameworks that maximise the benefits of ICT integration (Federal Republic of Nigeria, 2013; Nyenwe & Ishikaku, 2021). Such policy provisions reflect an awareness that ICT competencies are foundational to educational quality, national development, and competitiveness in the global knowledge economy.

Despite these policy efforts, the actual integration of ICT into teacher education programmes in Nigeria remains uneven and fraught with systemic challenges. Research across multiple Nigerian states and teacher training institutions reveals pervasive infrastructural constraints, including inadequate access to reliable electricity, insufficient internet connectivity, and a shortage of essential ICT equipment such as computers and projectors. These infrastructural deficits significantly impede the ability of teacher educators and trainees to engage in technology-enhanced teaching and learning. Furthermore, limited funding and suboptimal allocation of resources have exacerbated these infrastructural challenges, leaving many institutions ill-equipped to support robust ICT adoption.

Another major barrier to effective ICT integration is the low level of ICT literacy and digital competence among teacher educators and trainees. While some studies indicate moderate levels of ICT proficiency among practising teachers, the application of these skills in pedagogical practice remains limited due to inadequate professional development opportunities, lack of targeted training, and minimal institutional support for ongoing skills enhancement. These gaps are compounded by resistance to change and entrenched reliance on traditional didactic teaching methods, which diminish the perceived value and utilisation of digital tools in instructional design and delivery.

Cultural and attitudinal obstacles also hinder the seamless adoption of ICT in teacher training. In many cases, educators demonstrate hesitancy toward embracing technology owing to technophobia, scepticism about its pedagogical relevance, or the belief that technology complicates rather than enriches instructional processes. This reluctance is further reinforced in environments where there are insufficient institutional encouragement, recognition, or incentives for integrating ICT meaningfully into teaching practice. The implications of these challenges are profound. When ICT integration remains superficial or poorly supported, teacher education programmes risk failing to produce educators who are adequately prepared for contemporary classrooms. This gap undermines the quality of teaching, limits students' exposure to digital learning environments, and constrains Nigeria's ability to harness ICT as a driver of educational innovation and socio-economic development.

Notwithstanding these challenges, the prospects for ICT integration in Nigerian teacher education are significant. Empirical evidence suggests that when equipped with adequate infrastructure, targeted professional development, and supportive policy environments, ICT can markedly improve teaching quality, facilitate collaborative learning communities, and bridge geographic and resource divides. Initiatives that prioritise continuous digital pedagogy training, such as UNESCO-supported teacher development programmes, have demonstrated measurable improvements in educators' confidence and competence in using

technology for instructional purposes, highlighting the potential of well-designed interventions to catalyse meaningful change.

In light of these findings, a comprehensive and multi-pronged approach is required to strengthen ICT integration in teacher education. Policymakers must prioritise the expansion of ICT infrastructure in colleges of education and other teacher training institutions, ensuring reliable power supply, widespread internet access, and adequate digital resources. Teacher education curricula should be restructured to embed digital pedagogy as a core competency, with sustained professional development opportunities that reflect international best practices. Additionally, fostering partnerships with technology providers and private sector stakeholders can help bridge resource gaps and foster innovation ecosystems that support sustainable ICT adoption. Ultimately, by addressing both systemic barriers and capacity, Nigeria can advance toward a future where teacher education is technology-driven, learner-centered, and globally competitive, contributing to broader educational transformation and national development goals.

Significance of ICT in Teacher Education

The integration of Information and Communication Technology (ICT) in teacher education is widely acknowledged as a transformative strategy that enhances the quality, efficiency, and relevance of teacher preparation programmes. The significance of ICT in this context can be examined across multiple dimensions, including pedagogical innovation, professional development, learner engagement, and national educational advancement.

1. **Enhancing Pedagogical Practices:** ICT provides teachers with a diverse array of instructional tools that support dynamic, learner-centered teaching approaches. Digital platforms, multimedia resources, virtual simulations, and interactive software enable pre-service and in-service teachers to design lessons that are more engaging, flexible, and responsive to students' individual learning needs. By incorporating ICT, teachers can move beyond traditional lecture-based methods, fostering collaborative learning, critical thinking, and problem-solving skills among students. Moreover, ICT facilitates the integration of innovative pedagogical strategies such as blended learning, flipped classrooms, and online collaborative projects, which are essential for preparing teachers to function effectively in 21st-century educational environments.

2. **Supporting Continuous Professional Development:** Teacher education is not confined to initial training; it encompasses ongoing professional growth to ensure that educators remain competent, informed, and responsive to evolving educational demands. ICT provides teachers with access to a wealth of professional development resources, including online courses, webinars,

digital libraries, research databases, and professional learning communities. These platforms enable educators to continuously update their knowledge, acquire new pedagogical techniques, and engage in reflective practice, regardless of geographical or temporal constraints. This access to continuous learning opportunities enhances teachers' instructional capabilities and strengthens the overall quality of education delivered to students.

3. **Promoting Digital Literacy and Competence:** In an increasingly digital world, teachers themselves must possess strong ICT competencies to guide students effectively. Integration of ICT in teacher education ensures that pre-service teachers acquire essential digital skills, including proficiency in using educational software, designing digital learning materials, managing online assessments, and facilitating virtual classrooms. These competencies are vital for teachers to model appropriate use of technology, instill digital literacy in students, and prepare learners for participation in the knowledge-driven economy. By fostering ICT competence among teachers, teacher education programmes contribute directly to building a technologically literate workforce.

4. **Enhancing Access, Flexibility, and Inclusivity:** ICT facilitates broader access to teacher education programmes, particularly through online and distance learning platforms. This accessibility allows individuals in remote or underserved areas to participate in teacher training without the limitations imposed by physical infrastructure. Additionally, ICT tools can support differentiated instruction and accommodate learners with diverse needs, promoting inclusivity and equity in teacher education. By enabling flexible learning pathways, ICT strengthens the capacity of teacher education institutions to meet the needs of a diverse and growing population of educators.

5. **Contributing to National Development and Global Competitiveness:** Effective ICT integration in teacher education aligns with national development goals by equipping teachers to foster knowledge, innovation, and technological proficiency in students. Teachers trained in ICT are better positioned to prepare learners for careers in technology-driven sectors, enhancing Nigeria's competitiveness in the global economy. Moreover, ICT-enabled teacher education supports the cultivation of a knowledge-based society, where innovation, creativity, and digital problem-solving skills are central to socioeconomic growth. By strengthening teacher capacity through ICT, Nigeria can advance educational quality and achieve sustainable national development objectives.

6. **Facilitating Research and Evidence-Based Practices:** ICT also enhances teachers' and teacher educators' engagement in research and evidence-based practice. Through access to online journals, data repositories, and digital collaboration tools, educators can analyse pedagsogical trends, evaluate teaching methodologies, and implement instructional strategies informed by empirical evidence. This research-informed approach not only improves classroom practice but also contributes to the broader academic and policy discourse on educational reform in Nigeria.

In summary, the significance of ICT in teacher education is multifaceted. It enriches pedagogy, promotes lifelong professional development, strengthens digital literacy, enhances accessibility and inclusivity, supports national development goals, and fosters research-based practice. These benefits underscore the imperative for Nigerian teacher education programmes to prioritise ICT integration, addressing challenges proactively to unlock its full transformative potential.

Challenges of ICT Integration in Teacher Education

Despite the recognised importance of ICT in enhancing teacher education, its effective integration in Nigerian teacher training programmes faces significant challenges. These challenges are multifaceted, encompassing infrastructural, human, financial, policy, and cultural dimensions, which collectively hinder the realisation of ICT's transformative potential in teacher preparation.

1. **Inadequate Infrastructure and Resources**: A primary barrier to ICT integration in Nigerian teacher education is the persistent inadequacy of essential infrastructure. Many institutions lack sufficient computers, interactive whiteboards, projectors, reliable internet connectivity, and stable electricity supply; all of which are prerequisites for meaningful ICT adoption (Impact of ICT on Nigerian Educational System, 2023). In the absence of these resources, teacher trainees and educators are constrained in their ability to practice ICT-enhanced pedagogies, experiment with digital teaching tools, or develop digital content for instructional purposes. This infrastructural deficit creates a disparity between policy aspirations and classroom realities, limiting the capacity of teacher education programmes to produce digitally competent educators capable of leveraging technology in diverse teaching contexts.

2. **Limited ICT Literacy Among Educators**: While national policies advocate ICT inclusion in teacher education, the human capacity to implement these policies remains a major challenge. Studies indicate that a significant proportion of teacher educators and trainees possess limited ICT literacy, lacking confidence and competence in using digital tools effectively for instruction (Ekabua, Ogini, & Ogwara, 2018). This limited proficiency

manifests in difficulties with designing digital learning materials, managing virtual classrooms, integrating multimedia resources, or assessing learners using digital platforms. Without targeted professional development and continuous training, teachers may struggle to model best practices in ICT usage, thereby undermining the goals of technology-enhanced education.

3. **Insufficient Funding**: Funding constraints constitute a critical obstacle to ICT adoption in teacher education. Effective ICT integration requires sustained investment in hardware procurement, software acquisition, internet access, maintenance, and personnel training. However, budgetary allocations for education in Nigeria often fall short of meeting these requirements, leading to outdated or nonfunctional equipment, irregular internet connectivity, and limited training opportunities for both educators and students (Nyenwe & Ishikaku, 2021). Inadequate funding not only impedes the implementation of ICT programmes but also affects long-term sustainability, making teacher education institutions heavily reliant on ad-hoc interventions or donor support.

4. **Policy Implementation Gaps**: Although ICT is embedded in the National Policy on Education and other strategic educational frameworks, gaps in policy implementation remain a persistent challenge. Weak monitoring mechanisms, lack of accountability, and fragmented execution across federal and state institutions have resulted in uneven ICT adoption (Hanmfe & Masara, 2024). Some institutions may adopt partial ICT strategies, while others lag behind entirely, creating disparities in teacher training quality. Moreover, policy guidelines often lack clear operational frameworks, timelines, and evaluation procedures, limiting the effectiveness of ICT initiatives and contributing to inconsistencies in training outcomes.

5. **Resistance to Change and Cultural Barriers**: Beyond technical and financial limitations, cultural and attitudinal factors also impede ICT integration. Some educators resist adopting ICT due to comfort with traditional teaching methods, fear of technology, or perceptions that digital tools are complex, time-consuming, or irrelevant to their teaching context (Impact of ICT on Education, 2023). This resistance can manifest as reluctance to attend ICT training, avoidance of digital teaching practices, or underutilisation of available ICT resources. Addressing this barrier requires not only technical training but also a cultural shift in teacher education institutions, emphasising the value of technology in enhancing pedagogical effectiveness and student learning outcomes.

The challenges of ICT integration in Nigerian teacher education are complex and interrelated. Inadequate infrastructure, limited ICT literacy, insufficient funding, policy implementation gaps, and resistance to change collectively constrain the adoption of ICT-enhanced teaching and learning. Understanding these challenges is essential for designing targeted interventions that bridge the gap between policy objectives and classroom practice, ultimately ensuring that teacher education programmes produce educators equipped for the demands of the digital era.

Prospects and Opportunities for ICT Integration in Teacher Education

While the challenges of ICT integration in Nigerian teacher education are significant, the landscape also presents numerous prospects and opportunities that can transform teacher preparation and professional practice. Strategic interventions in curriculum design, professional development, funding, and the use of digital platforms can enhance the effectiveness, relevance, and sustainability of ICT adoption in teacher education.

1. **Curriculum Reform:** One of the most promising opportunities for ICT integration lies in comprehensive curriculum reform. Incorporating mandatory ICT courses into teacher education programmes ensures that all pre-service teachers acquire essential digital competencies before entering the classroom (Nyenwe & Ishikaku, 2021). Such courses should not only focus on basic computer literacy but also emphasize pedagogical applications of ICT, including the use of multimedia, educational software, virtual learning environments, and digital assessment tools. Curriculum reform must balance global ICT standards with local educational contexts, ensuring that teacher trainees are equipped to address both international benchmarks and the specific needs of Nigerian classrooms. By embedding ICT as a core component of teacher education, institutions can produce educators capable of fostering digital literacy, creativity, and innovation among students.

2. **Professional Development and Continuous Training:** ICT integration in teacher education is an ongoing process that extends beyond initial training. Continuous professional development opportunities, including workshops, online courses, seminars, webinars, and certification programmes, can enhance the ICT competencies of both teacher educators and trainees. Strategic partnerships with ICT providers, educational technology companies, and international organizations can provide access to cutting-edge tools, teaching resources, and global best practices. These initiatives enable teacher educators to remain abreast of emerging technologies and innovative pedagogical approaches, while also fostering a culture of lifelong learning. Well-structured professional development programmes can gradually reduce resistance to technology adoption and build confidence

among educators, creating a cadre of teachers proficient in integrating ICT into instruction.

3. **Enhanced Funding and Public–Private Partnerships:** Sustainable ICT integration requires adequate funding for infrastructure, maintenance, software acquisition, and training. Increasing government investment in teacher education institutions is crucial to ensure access to modern ICT resources and stable digital environments. Furthermore, public–private partnerships offer additional avenues to mobilise resources and expertise. Collaborations with technology companies, philanthropic organisations, and donor agencies can provide hardware, software, internet connectivity, and technical support to underfunded institutions. Such partnerships also create opportunities for innovation, research, and pilot projects that can inform broader ICT strategies in teacher education. Strategic funding and partnerships can therefore bridge infrastructure gaps and strengthen the overall capacity of teacher education programmes to implement ICT effectively.

4. **Leveraging Online and Distance Learning Platforms:** The proliferation of online and distance learning platforms presents a transformative opportunity for ICT integration, particularly in regions with limited physical infrastructure. Virtual learning environments, e-learning portals, and Massive Open Online Courses (MOOCs) allow teacher trainees to access educational content, engage in interactive learning activities, and participate in professional networks regardless of location. These platforms offer flexibility, scalability, and cost-effectiveness, complementing traditional classroom instruction while expanding access to teacher education. Additionally, online platforms facilitate collaborative learning, peer mentoring, and exposure to global teaching practices, equipping teachers with the skills necessary to navigate technology-enhanced learning environments.

5. **Promoting Research and Innovation:** ICT integration provides an opportunity for teacher educators and trainees to engage in research-driven instructional practices. Access to digital research databases, online journals, and collaborative platforms enables teachers to analyse trends in pedagogy, evaluate the effectiveness of instructional strategies, and implement evidence-based innovations. Such engagement promotes a culture of inquiry and continuous improvement within teacher education institutions, enhancing the overall quality of teaching and learning while contributing to the knowledge base on ICT in education.

The prospects for ICT integration in Nigerian teacher education are significant, provided that strategic reforms and targeted interventions are implemented. Curriculum redesign, professional development, enhanced funding, public–private partnerships, online learning platforms, and research-driven practices offer avenues to overcome existing challenges and maximize the benefits of ICT. By leveraging these opportunities, teacher education programmes can produce digitally competent, innovative, and globally competitive educators who are capable of transforming teaching and learning in Nigeria's rapidly evolving educational landscape.

Recommendations

Based on the review of literature and the analysis of challenges and prospects of ICT integration in Nigerian teacher education programmes, several strategic recommendations are proposed to enhance the effectiveness, sustainability, and impact of ICT adoption. These recommendations target policymakers, educational institutions, teacher educators, and relevant stakeholders.

1. While national policies acknowledge the importance of ICT in teacher education, gaps in implementation undermine their effectiveness. Federal and state ministries of education should review existing ICT policies and strengthen them with clear operational guidelines, measurable targets, and defined timelines. Additionally, monitoring and evaluation mechanisms must be institutionalized to ensure compliance, identify gaps, and provide timely interventions. Establishing accountability frameworks, with periodic audits of ICT adoption in teacher education institutions, will help bridge the gap between policy objectives and classroom realities, ensuring that ICT integration is systematically implemented and sustained.

2. Adequate and reliable infrastructure is a prerequisite for meaningful ICT integration. Educational institutions should prioritize investment in ICT facilities, including high-quality computers, projectors, interactive whiteboards, stable internet connectivity, and power backup systems. Institutions should also adopt digital resource centers or e-libraries to provide students and educators with continuous access to relevant instructional materials. Strategic infrastructure investment will not only facilitate the practical use of ICT in pedagogy but also enhance the digital competence of pre-service and in-service teachers.

3. To address the persistent challenge of limited ICT literacy among educators, teacher training institutions should implement structured and continuous ICT training programmes. These should include hands-on workshops, online certification courses, and mentorship schemes that integrate technology into teaching, assessment, and curriculum delivery. Both pre-service and in-service teachers should be encouraged to engage in lifelong learning and

develop the digital skills required to effectively utilize ICT tools in diverse educational contexts. Furthermore, institutions should provide incentives and recognition for educators who demonstrate innovation and excellence in integrating ICT into teaching and learning.

4. Collaborations with technology firms, non-governmental organizations (NGOs), international educational bodies, and donor agencies can provide critical support for ICT integration. These partnerships can facilitate the provision of hardware, software, internet access, and training resources, as well as share best practices and innovative models of ICT-enhanced teacher education. Collaborative initiatives, such as joint research projects, ICT pilot programs, and knowledge-sharing networks, can foster a culture of innovation and continuous improvement while strengthening the institutional capacity for sustainable ICT adoption.

5. Beyond infrastructure and training, efforts should be made to cultivate a positive attitude toward ICT among educators. Institutions should encourage experimentation with digital tools, provide platforms for sharing successful ICT-based teaching strategies, and recognise educators who effectively integrate technology into their practice. By promoting a culture of innovation, teacher education programmes can overcome resistance to change and position ICT as an integral component of modern pedagogical practice rather than an optional add-on.

Conclusion

The integration of Information and Communication Technology (ICT) in teacher education programmes in Nigeria represents a critical opportunity for transforming the quality, accessibility, and relevance of teacher preparation in the 21st century. This paper has demonstrated that, while ICT offers numerous benefits, including enhanced pedagogical practices, professional development, digital literacy, access to resources, and alignment with global educational standards, its adoption in Nigerian teacher education is hindered by multiple challenges. These include inadequate infrastructure, limited ICT literacy among educators, insufficient funding, inconsistent policy implementation, and resistance to change.

Despite these constraints, the prospects for ICT integration are substantial. Strategic curriculum reform, robust professional development programmes, targeted investment in infrastructure, public–private partnerships, and the use of online and distance learning platforms can significantly enhance the effectiveness of ICT in teacher education. Furthermore, cultivating a culture of innovation and digital engagement among educators and trainees is essential to ensure that technology is meaningfully integrated into teaching, assessment, and classroom management.

Ultimately, ICT integration in teacher education is not simply a technological upgrade; it represents a fundamental pedagogical and institutional transformation. By embracing ICT strategically, Nigerian teacher education institutions can produce educators who are digitally competent, professionally agile, and capable of fostering learner-centered, innovative, and globally relevant classrooms. Such transformation is essential for positioning Nigeria as a competitive player in the global knowledge economy, improving educational outcomes, and contributing to sustainable national development. The realisation of these goals requires coordinated efforts among policymakers, institutions, educators, and stakeholders to address existing challenges and harness the full potential of ICT in teacher education.

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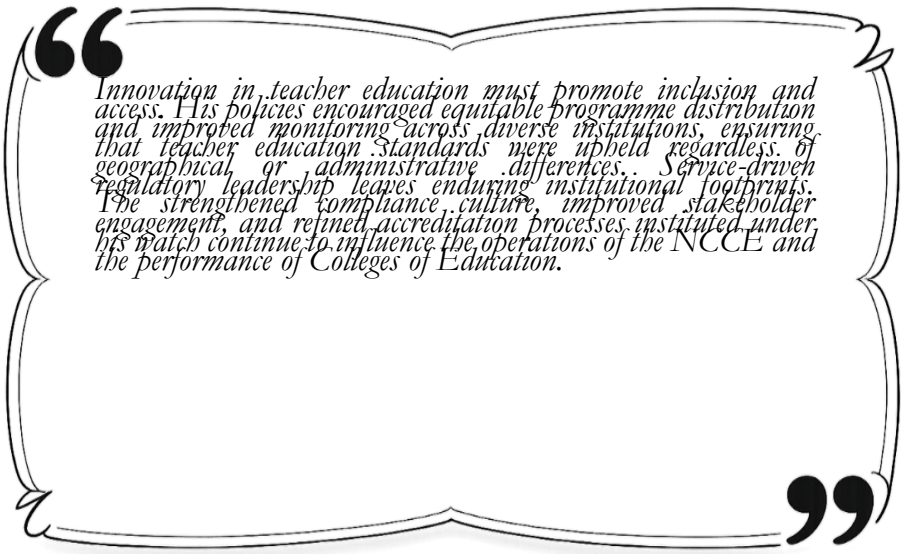
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Chapter 28

Ethical Mentorship: A Requisite for A Worthwhile Teacher Professionalism

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Prologue

It can be referred to as the consciousness between what a person has the right to do and what is right for the person to do. The ethical strength of a person determines his character, choices and his faithfulness unto God. This implies that the strength of a person's ethics determines what qualities a person develops which are seen in his/her character. The first care-giver any learning environment provides for a student is a special parent who is known as a teacher/facilitator. A teacher's quality is shown in his character, words, choices and behavior which can bring continuous renewal and regeneration to his/her life and his students. In the same way it can make or mar a student's life. A teacher's character and values are major yardsticks with which a focused and faithful student measures the worth of such teacher. One of the major foci of teacher professionalism is the ability of a teacher to compose his character using the teaching code of ethics such as honesty, integrity, empathy, humility and competence for appropriate relationship and nurturing of students. A teacher earns trust of most of his students through his character and values. Life of students of all levels (mature or younger) are forever influenced by qualities of their teachers through relationships and mentorships. This kind of mentorship programme usually leads to trusting and lifelong relationships.

It is based on this backdrop of ethics, character, lifelong relationship, competence, hard work, productivity and excellence through ethical mentorship by a professional teacher that the author of this article introduces the great academic luminary - Professor Paulinus Chijioke Okwelle who is being celebrated in this literary collection.

Prof. is an erudite scholar, a quintessential academic of a typical quality. A prolific writer who has made outstanding contributions to creativity and literary works. An astute administrator, a manager who has taken unprecedented strides in community,

societal and national development. A man of principle, an initiator, innovator, a leader per excellence, who has won many accolades in

both national and international scenes, a parent who cherishes family life and lots more. May the candle in your life never grow weak and may God the Almighty continue to crown your efforts with success to HIS own Glory by HIS Grace in Jesus Mighty Name, Amen.

Abstract

This paper asserts that ethical mentorship by teachers is quite imperative for a worthwhile teacher professionalism. It affirms that many students – young ones and adults in Nigeria are at the crossroads of moral ambiguity which blurs their vision between sense of right and wrong, good and bad, success and failure, virtuous and evil particularly at this time in which greed manifests in the form of "get-rich-quick syndrome" among youths in Nigeria. Furthermore, corruption, impunity, evil and criminality of different dimensions rears their ugly heads in the country and poverty is weaponized by most of the elites and political class. This state of affairs which is quite disturbing and worrisome results to decline in integrity, creativity, hard work and ethical values among young people and adults which generally cause further decline in productivity, economic transformation among all sectors in the country. This paper noted that a teacher as an instrument of social change and "maker of personalities" should to a great extent bequeath students with moral clarity in order to nip the moral complexity that challenges their existence in the bud and restore the sense of right and wrong; good and evil in them before it is completely destroyed. This will lead to effective and reinforced teacher professionalism, strong ethical mentorship and guidance for lifelong development. It will further lead to worthwhile institutional culture, progress and trusting relationships in families, societies and the entire nation. Furthermore, it will lead to fairness, trust, and progress for development in the entire society. This paper defines a teacher, his qualities and roles for effective professionalism. It discusses a teacher's expected character in relation to nurturing students for true teacher professionalism. The paper related strong ethical mentorship to effective teacher professionalism and discusses Nigerian ethical dilemma and uncertainty in youths and students among others. It concluded that for any group of individuals, society or nation to achieve stated goals and progress, the younger generations must be continuously guided by teachers, caregivers and leaders in the fear of God by clarifying in good time all moral ambiguities and cultivating the spirit of creativity and hard work in them for necessary productivity. It recommended among others that teachers should see their job more as "a calling" from God. They should see themselves as role models who are highly prized and valued by the society because by their actions and inactions they can make or mar the lives of their students which can have negative intergenerational consequences on the society contrary to progress, development and God's will.

Keywords: *Ethical mentorship, teacher professionalism, ethical character, moral ambiguity, moral clarity*

Introduction

Education can simply be defined as an act of sharing meaningful life experiences between a teacher and a student or group of students. Without education, there cannot be a progressive future for any society or nation (Niazi, 2025 and El Alaoui,2019). Education can be referred to as a powerful tool which teachers use to transform their students and the world. Teaching is 'a calling', it is a passion, 'not just a job like other jobs. It is seen as a call by God for dedication, mentorship, creativity and transformation of the mindsets of students – young and old alike which is beyond mere transmission of knowledge. This they do in order to bring out the best in the students and the society. Teachers are pathfinders, they nurture and imbibe in their students' right values, behavior and the fear of God which is the beginning of wisdom.

This is quite necessary to avert ethical complexity and immoral life and promote right sense of judgement, critical and analytical thinking for creativity, innovation, productivity and progress. Ethical mentorship is fostered in students of all characteristics from cradle to grave to sustain active and self-reliant personalities for worthwhile professionalism. Teachers imbue a mindset of mental freedom and not bondage or enslavement in students to enable them challenge contradictions and social injustices for a better society (Nkansah,2025). Above all, teachers nurture their students in the image of God because teachers are seen as an embodiment of godly, moral and ethical values for transforming students towards an exemplary life.

When I was growing up, teachers in schools and churches were highly revered and respected. Any child who is born of a teacher is highly admired. They were honoured in places of great events because many people have a strong desire to be like them. This afore-stated qualities of teachers and aspirations of people are the viewpoints of the public in respect to teachers prior to the 21st century. However, in the recent time, there has been disrespect and distrust that our profession has experienced over the past century. The questions at this instance may therefore include "Why are teachers viewed so much in the wrong perspective in this 21st century? What are the causes of moral dilemma resulting to moral decay among students, youths and adults in our society? To what extent do teachers have strong ethical virtues, good mental health and good character for ethical mentorship of their students for a productive, rewarding and successful life? These questions are for the readers of this article to articulate and ponder for family, institutional and societal transformation.

In the right sense, a teacher is a hero and model to his or her students (Feliza,2025). He is an epitome of good conduct and exemplary life. Teaching implies touching lives forever and the influence of a teacher cannot be erased from a student's mind. Indeed, teaching can be described as the "making of persons". This underscores the role of a teacher as a moulder of students' personality. He serves as a role model and a guide which is beyond transmitting just the content - the curriculum. He moulds

students just like a potter moulds a vase and shapes it creatively to bring out the best product. In the context of this paper, a teacher is seen as a professional, special parent, facilitator, guide, mentor, change agent, motivator, resource person and pathfinder. A co-learner who impacts positively on the mindset of students to enable them gain knowledge, skills, attitude and strong ethical character for necessary transformation in order to live a Godly and exemplary life for personal, family, societal transformation and national interest. For these stated qualities to be attained by a teacher for true and effective professionalism, a teacher should be seen as an epitome of strong ethical character. Teachers' professionalism bothers on the fact that teachers should have competence, capacity and strong ethical conducts for trusting and lifelong relationship and transformation among their students. Strong ethical conducts comprise having a strong ethical character for continuing mentorship of students (Feliza,2025 and Ruhayu et al (2023). Strong moral character of a teacher is a requisite for ethical mentorship and true professionalism. Both are inseparable because teachers as moulders of personality have profound impact on students' lives. Students to a great extent absorb all or almost the values of their teachers. The author of this article has seen many children asking their parents "Are you my teacher"? My teacher says "it should be done this way and not your own way". This shows the value and trust such children repose on their teachers. In this time of individual and ethnic distrust, corruption and greed as a result of "get-rich-quick syndrome" among youths and adults in Nigeria, teachers' ethical mentorship which is a function of teachers' strong ethical character and conduct is seen as a revolutionary stride which could cause a dramatic positive change to transform our children from the challenges of moral ambiguity and dilemma and bequeath them with moral clarity (Obidiegwu, 2023, Abaribe, 2025).

In order to avert this foreseeable doom seen in the moral complexity and large- scale corruption of our students, which arise from the unfortunate state of affairs in Nigeria where affluence through detestable means is honoured and cheered, there is need to rekindle moral integrity in our youths by providing moral clarity through ethical mentorship by teachers for true and worthwhile professionalism. In Nigeria at the present time, affluence through evil ways is applauded and valued so much by youths to the extent that some of them murder their parents, relatives and neighbours in cold blood for money rituals. They seem to lack the ability to distinguish between affluence through hard work and through abominable means. This results to a degrading value and moral system where crime is exalted and hard work is derided and ridiculed. This state of affairs of moral ambiguity in our children which causes uncertainty and confusion in them about what is good or upright and evil or detestable is perturbing and worrisome. It causes a lot of concern to all people of good conscience in Nigeria, hence, an urgent need for ethical and practical mentorship that begins early in life and continues throughout life by teachers for economic transformation and worthwhile professionalism.

Definition and Qualities of a Teacher for Effective Professionalism

A teacher is defined in this paper as an educator who guides and shares meaningful experiences with students irrespective of student's characteristics through mentorship in school or out of school for a worthy life. He or she is a facilitator, mentor, guide, change agent, resource person, counsellor and co- learner (Tenghu et al (2018) and (Obidiegwu, 2023). He does not see himself as a know-all or custodian of all knowledge who just transmits information to students but a guide, mentor who helps students in different settings (formal, informal and non-formal) to acquire knowledge, skills, and ethical values and through his exemplary character helps students to live a fulfilled, productive and rewarding life (Obidiegwu, 2023).

A good teacher is a special parent, a positive role model who has a strong ethical character. He embarks on open and empathetic listening and communication for free expression in partnership with his students. He is flexible, insightful and discerning. He promotes mutual respect and trust, gives full attention, motivates, acknowledges students' feelings and give constructive feedback. Above all, a dedicated professional teacher has interest in both emotional and academic problems of students bearing in mind that students are future leaders of the society and teachers the builders of tomorrow. He collaborates and have patience with them for successful learning outcomes.

All these qualities imply and sum up to the fact that a teacher should have a strong ethical character and competence in order to instill moral guidance and further imbue human values such as honesty, integrity, hard work, creativity, respect and responsibility in students for progress and development. In addition, in shaping students conduct and worldviews, a teacher is said to be a "living curriculum" who models the importance of building competence, capacity, character for accountability, honesty and integrity for truthful living and development. He inspires and mentors students and helps to build their character, learning and skills for worthwhile service to humanity.

What then is Ethical Mentorship

Ethics can be referred to as values relating to human conduct with respect to right and wrong behavior. The word ethics is derived from a Greek word "ethos " meaning " Character" and from the Latin word "mores" meaning "customs" (Henk ten Have and Maria (2021). Ethics and culture are deeply intertwined; however, this paper aligns more with the Greek perspective because to the author ethics and character are inextricable. A person's ethical conduct guides the person on his actions which is reflected on the persons character and this implies that the ethical standard of any person is reflected in his or her everyday life.

Ethical is an adjective for the word ethics. Ethics relate to principles of morality which pertains to right and wrong conduct especially of a profession. Other

synonyms of ethical are moral, noble, righteous and virtuous. This paper is concerned with ethical mentorship, that is, mentorship that predicates on morality and righteous conduct of a teacher, that is guided by exemplary life of a teacher and other caregivers from whom it is continuously bequeathed to his students.

Mentor can be used as a noun in which it refers to as an experienced and trusted adviser or a verb in which it implies the act of helping someone to support his/her personal, academic and professional development. The word mentor originated from Greek mythology. It is derived from the Greek word "menos" meaning mind, spirit or force (Hong,2024). The word evolved to signify a guide or wise trusted counselor for a less experienced person. This is the perspective it is viewed by the author of this paper.

According to Garvey (2023), mentorship belongs to the part of speech of a noun which refers to the role of guidance, influence or direction giving by a mentor. It is the practice of the role of being a mentor (Atenas et al 2023). It is defined in so many ways. It involves a relationship where a more experienced person (a mentor, in this context, a teacher) shares knowledge, skills and guidance to help and facilitate the learning of a less experienced person (a mentee in this context, a student).

There are different types of mentorships such as one on one, peer, reverse, flash, formal, informal, peer to peer mentorship as classified by different authors (Mullen and Klimatis, 2019). However, this paper is particularly concerned with ethical mentorship. An ethical mentor focuses on the word of God, character, competence, skill, hard work, knowledge and psycho-social support such as building confidence, independence and providing encouragement to nurture the growth of students.

Ethical mentorship involves a kind of mentorship which involves a strong ethical foundation and principles by a mentor (a teacher) to the mentee (student). This kind of mentorship requires mutual respect, integrity, fairness, free communication, accountability, honesty and exemplary life which implies emulating the lifestyle of the mentor. It requires the mentor who is a teacher to act in the mentees best interest, empower, build justice, trust, autonomy and competence, and transparency while also establishing boundaries by saying No when No is required and Yes when it is right by following Godly examples and living exemplary life.

An ethical teacher(mentor) is seen as a role model. He/she lives an inspiring life demonstrating strong ethics such as being truthful and consistent with his words and actions, remain humble and modest, establish mutual respect, perseverance and inclusivity. He guides students and leads with confidence. He is service oriented rather than self-seeking. He is goal oriented, resilience, render care and empathy for students' wellbeing which implies living a faithful and Godly life (Feliza,2025) Ethical mentorship is quite Dear to God; hence, the word of God emphasizes the value of guidance, counselling and teaching. For example, "people learn from one

another just like iron sharpens iron" (Proverbs 27;17). This emphasizes the relevance of mutual relationship and trust among one another in teaching and learning environment. If a teacher debases integrity, what will become of his/her students? A question for the reader of this paper. In the same way the word of God noted "Take the teachings that you had me proclaim in the presence of many witnesses and entrust them to reliable people who will be able to teach to others also". (2nd Timothy 2 vs 2). In this context, St Paul's the apostle of Christ has confidence that he was passing across a worthwhile message to his people. A teacher should be confident enough in his/her message to students in the classroom and out of classroom. He also requests that such message should be passed across from one generation to another in order to ensure it is lifelong and endures forever. Hence, a teacher's message has a multiplier effect. It is supposed to transcend generations, have positive impact on the mindset of students, be transformational and lead to intergenerational freedom, progress and development, rather than chains, bondage and retrogression.

In Nigeria as it stands today, many young ones seem to be in chains and bondage because of love for money, poverty, greed and neglect for hard work (Uzoji and Ridwan (2025), Enaikele, Adeleke and Adeoye (2022). They embark in sycophantic bootlicking of some politicians and influential people (Abaribe,2025). They are more interested in paltry temporary selfish interest and gains instead of excellence, ingenuity, resilience, creativity, self-reliance and hard work. So many students (boys, girls, mature) avoid hard work in schools at all levels and believe in all manner of "sorting" and "mercenaries" for their examinations and so they continue in corruption after graduation. Who do they "sort"? Unfortunately, their teachers. A teacher who is supposed to be an epitome of integrity and good conduct who is supposed to be the good shepherd. It's really unfortunate and regrettable. Our students are caught in the web of moral ambiguity. They are at the crossroads of moral dilemma and complexity. Most of them are uncertain on what is good or bad, right or wrong, evil or virtuous at the present time because evil is cheered and applauded. It is becoming a norm because as my people says "When evil lasts for a long time it becomes a norm". They engage in servile and corrupt behaviour involving excessive flattery of influential people to gain favour from politicians and powerful persons in the society by dishonest and insincere means instead of standing on their feet, believing in themselves and God and working hard. They need to be taught independence and self-reliance by imbuing in them a mindset of mental freedom and self-reliant "from cradle to grave "The question is therefore, who will bell the cat? The onus lies on teachers and all facilitators of learning at all levels who need to make remarkable impression in the mindset of their mentees and caregivers. There is need for the reverse gear to be applied as soon as possible through ethical mentorship for lasting teacher professionalism before the situation becomes irredeemable. However, God will help us by HIS grace. Hope cannot be lost for God "Can do, Undo and Redo". HE is a "Master Creator and Recreator".

Figure 1 shows a framework of ethical mentorship:

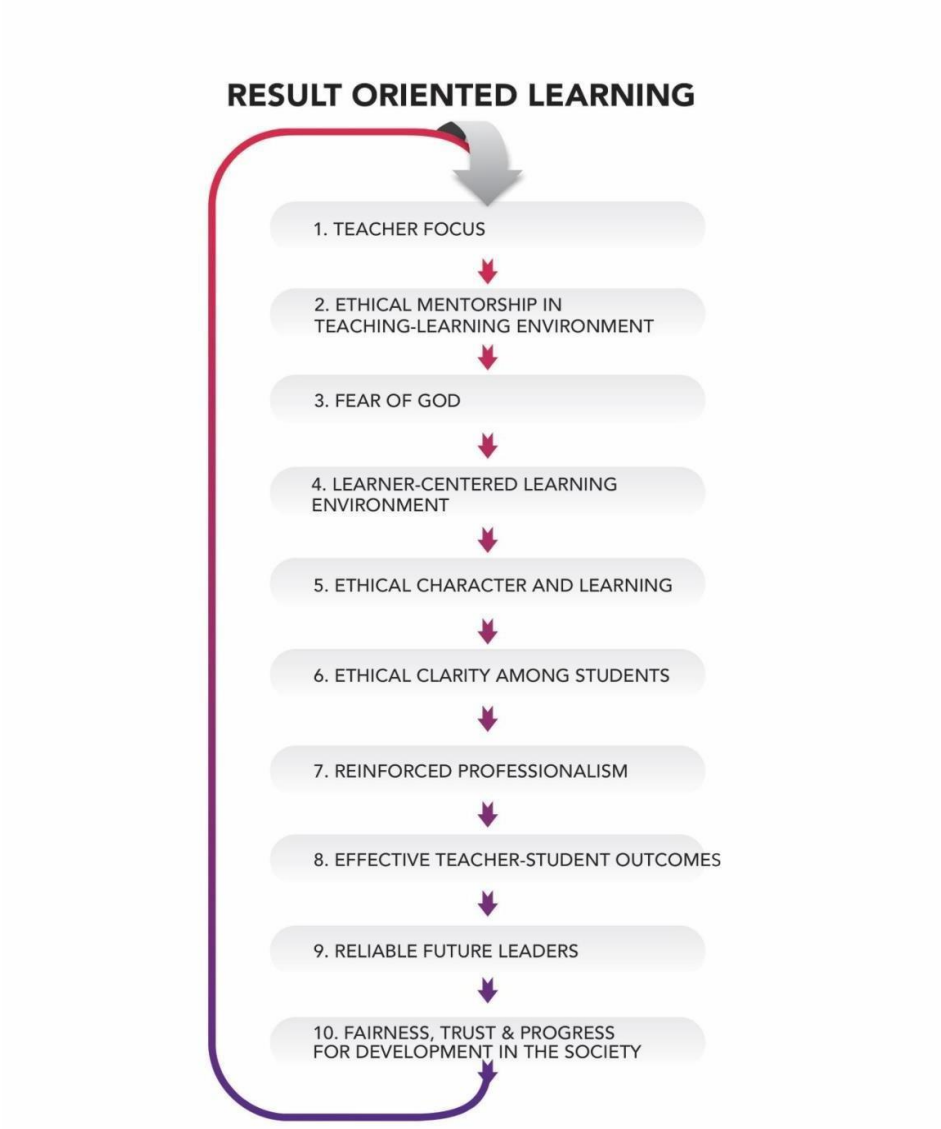


FIG. 1 FRAMEWORK OF ETHICAL MENTORSHIP FOR A WORTHWHILE TEACHER PROFESSIONALISM

Source: Obidiegwu 2025

Fig. 1 illustrates vividly that if a professional teacher or a care-giver in any learning environment has ethical character, he/she tailors his teachings, conducts, words and actions toward ethical mentorship. Ethical character in this paper refers to a teacher's ability to act in accordance with moral principles and values which in turn are undoubtedly imbued in students through his guidance and mentorship. This leads to many positive outcomes such as teamwork, fairness, honesty and welfare for the teacher, students and the society. This further implies that such teacher has godly principles and fear of God which is the beginning of wisdom, (Pro:1:7&9:10). He uses such wisdom as the ultimate and acceptable standard for judging actions as right or wrong, for facilitating, guiding and mentoring students. God's words provide a stable moral compass which directly contrasts with shifting cultural norms and moral standards. An ethical teacher guides students to cultivate virtues such as integrity, accountability, empathy, compassion and competence among others which are needed for true teacher professionalism, rewarding life and leadership (Olajarova,2017 and Feliza 2025). For this reason, he uses student-centered learning strategies and directs his focus towards mutual development rather than solely his own gains for fostering ethical character in students. This provides ethical clarity because the students admire the teacher as a "living curriculum", a role model who is competent enough to deliver very well the desired competence, character and learning which is the basis on which certificate is awarded to them. They see the teacher as a role model and aspire to be like him. They can perceive right from wrong, good from evil and act appropriately from cradle to the end of their lives. As the word of God says "Bring up a child in the way he should grow and he will not depart from it even when he is old" (Proverbs 22:6). This is a principle about the lasting impact of early ethical and moral instruction. This implies that ethical and positive guidance of a teacher or any care-giver establishes a student's lifelong character which further implies that parents and teachers should live by example and discipline their children from the cradle. The reward of ethical guidance has multiplier effect in any learning environment. It leads to reinforced and sustainable ethical conducts in decision making, hard work, result-oriented learning, successful outcomes and productivity among students, their teachers and the entire society for true teacher professionalism, effective instruction, societal and national development while unethical mentorship leads to the contrast.

Teacher Professionalism- What Is It?

In the previous section, teacher definition and ethical mentorship was discussed in relation to the context of this paper. This section will go ahead to discuss teacher professionalism. Teachers are active agents of change in the society.

They play active roles in nurturing and shaping the professional roles and practice of their students for a better society. The word "Profession" is derived from a Latin verb "Profiteor" which implies to declare publicly, to freely own, to openly confess or

profess (King,1985). A profession can be referred to as a career-path that needs special training or skills which involves a high level of education. According to some scholars (Mueller, 2015), a profession is a calling requiring specialized knowledge which commits its members to ensure preparation which includes instructions, skills and methods as well as in the scientific, historical or scholarly principles underlining such profession. To profess is to make open or public.

As defined by Merriam-webster dictionary (2025), professionalism refers to the skill, good judgement and polite behavior that is expected from a person who is trained to do a job well. Similarly (Mahajan et al,2016) noted that behaviors, commitment, values and goals that characterize a profession constitutes professionalism and any member who engages in such professional activity is called a professional. A professional is governed by codes of ethics. A professional professes commitment to competence, integrity, morality, altruism and promotion of public good within the profession. Professionals are accountable to those they render service and the entire society. Professionalism implies consistency in display of ethical codes, responsibility and respect in one's profession. It is a set of standard or principles, competence or skill that an individual is expected to adhere to in a work place or in his profession.

Teacher professionalism which this paper is focused on refers to qualities, attributes which includes conducts, skills, knowledge and values which are expected to be demonstrated by professional teachers in their roles and responsibilities as educators in their everyday life (in school and out of school). It includes subject matter-competence and effective teaching but most importantly goes further to encompass mentorship, good conduct, commitment to lifelong learning in order to positively influence students for a rewarding and fulfilled life. It includes set of responsibilities which a teacher must adopt in order to ensure sustainable and worthwhile service to students and entire humanity (Shokri et. al 2022). A professional teacher is a dedicated facilitator of learning, a guide, mentor, resource person, co-learner who helps students of different characteristic to develop effectively in competence, character and learning, in school and out of school (Obidiegwu,2023).

Teacher professionalism has been defined in different ways by different authors. According to the University of Montevallo (2025), professionalism in teaching means a set of implied and explicit standards which an educator is expected to adopt while working as a teacher which involves interacting with students, colleagues, administrators and other members of the community in an appropriate and respectful way which encourages a successful learning environment. Further to the viewpoint of the University of Montevallo, Muller and Cook (2024) noted that teacher professionalism is dynamic and multidimensional. According to the authors, it is a lifelong process which involves specialized knowledge and competence. It includes personal attributes such as empathy and patience, social skills such as collaboration

and professional ethics. Furthermore, Muller and Cook noted that it involves research and best practices in order to improve teaching methods. These skills, competence, social and personal attributes implies that a professional teacher who is goal oriented should be self-disciplined and have fear of God for discerning evil and good, bequeathing same to his students for achieving positive outcomes in any learning environment and in life. This is a major justification for Figure 2 as shown by Obidiegwu (2025).

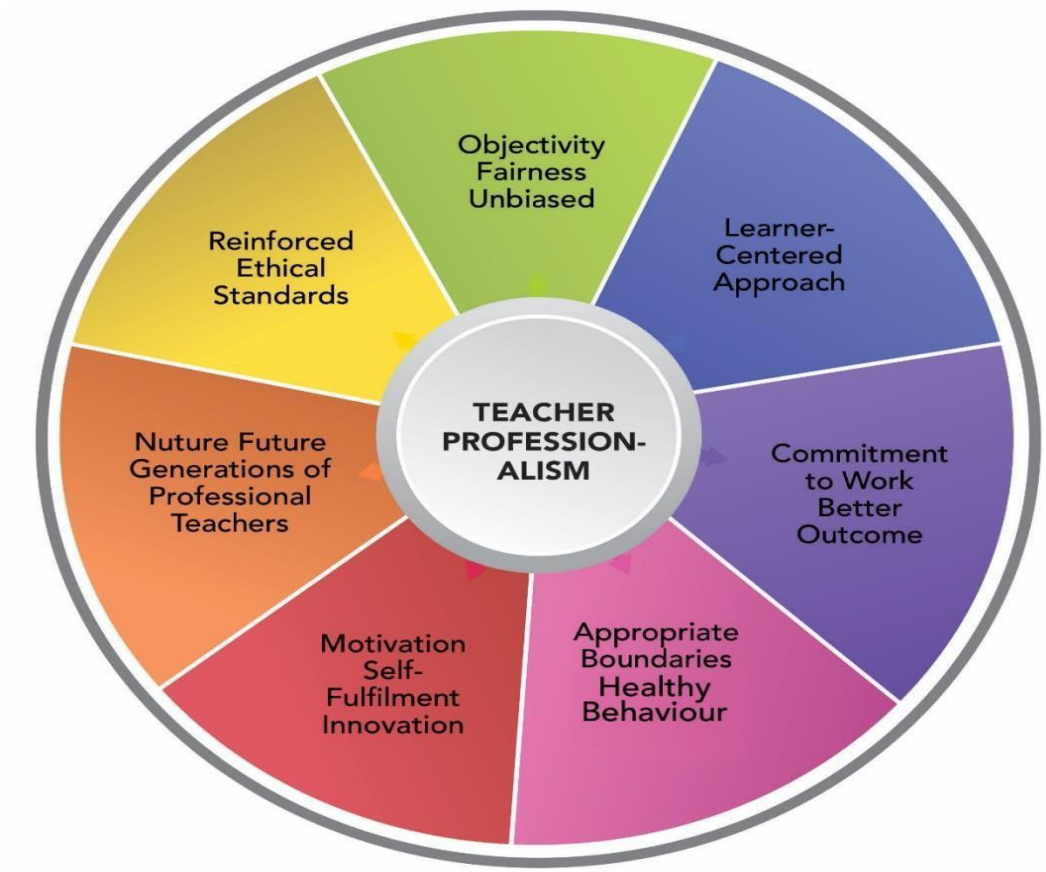


FIG. 2: TEACHER PROFESSIONALISM CHART

Source: Obidiegwu 2025

In a simple and precise way this chart exposes some of the major qualities which a professional teacher must possess, the approach to be used in teaching (learner-centered approach) and the likely outcomes to be expected for true teacher professionalism and for growth and development of the learner, teacher and the entire society. It is geared towards nurturing a generation of future leaders who has integrity, empathy, clear communication, global awareness and adaptability skills.

Teacher professional roles are not static but dynamic, it is a lifelong process which should be shaped and adapted-to by teachers as events evolve in the light of the unprecedented changes in this 21st century. Issues of moral decadence and complexity as faced by youths and adults in our country is a major challenge which needs to be addressed by parents and teachers in both formal, nonformal and informal education settings for meaningful growth and development of an individual and the society.

Recommendations:

Teachers should see their job "as a calling" which is quite beyond just their personal paycheck but involving self-fulfillment and service to God and the society. Based on this core principle, training and instruction should be based on character, hard work and creativity in all families, institutions and organizations for personal and societal development. This is because character training and good values seem to be downplayed in schools and focus placed on subject matter. Skills training which nurture values, attitudes and ethical behavior should be integrated in the school curriculum. Moral instruction alone cannot be enough in achieving this worthwhile development. Education without good character has dangerous consequences as it stands in Nigeria at the recent time in which corruption and criminality are rearing their ugly heads in all circles.

All institutions of learning should reward proven altruism, dedication and hard work among teachers and students. Furthermore, Prize and cash award should be instituted in all learning environments for the best ethical student and staff at all levels of education. Hard work must be respected and honored at all learning environments (formal, informal and non-formal) and at all levels of education (from nursery to university).

Government should be committed to teachers' wellbeing, welfare and mental health in order to promote the health and wellbeing of teachers for sustainable ethical mentoring, job satisfaction and fulfillment in the profession.

Pastors, Priests and Imams who are also facilitators and mentors in their faiths should preach the word of God with due sense of responsibility and ethics. Their message to their congregation should focus on ethical conduct, integrity, hard work and selfless service for building themselves and the society and not on fundraising, amassing wealth, building projects and pursuit of material things which are ephemeral. They should embark on value re-orientation in all their faith-based programmes, de-emphasize affluence through evil means and emphasize good character and Godly life. They should decline church/mosque thanksgivings from dubious elites and politicians and individuals who are seen as notorious in the society. This is necessary for achieving ethical character and good values among their members and the building the society as a whole.

Institutions at all levels should on continuous basis conduct seminars and workshops on ethics for teachers and employees for ethical decisions, policies, progress, productivity and development in the society The national orientation agency, town unions, village heads and president generals of all community unions should embark on value re-orientation on ethical mentorship and righteousness on continuous basis for renewal and regeneration of the mindsets of people through all media for a better society. When ethical mentorship becomes consistent in all areas of life, individuals are more likely to demonstrate honesty, integrity, creativity and competence for overall progress.

Machineries should be set up for appointing leaders at all levels of education, institutions and organizations based strictly on proven ethical conduct and character, capacity and competence which such person has displayed in the past in order to reposition the mindset of people for better service in the society.

There is need for scholarly papers to provide awareness for both teachers and students for direction and redirection in their roles and responsibilities to enable this "raging flood of moral ambiguity/complexity be checked at the threshold" before it becomes disastrous in the entire country. This is because as my people says "when evil lasts for a long time it becomes a culture".

Conclusion:

Teaching profession has experienced disrespect and distrust by the public because most teachers compromise ethical conduct, creativity and hard work in their messages to students. This results to the inability of majority of the teachers to influence positively their student's behavior which affects the overall quality, outcome and credibility of the teaching profession. This situation of unethical behavior among most teachers gave rise to many students and graduates who are at the crossroad of moral ambiguity and dilemma. A single person or group can make a difference in the society. In the same way such a person or group can also corrupt and cripple a society. Teachers are seen as change agents and pathfinders; they are "makers of personalities"; hence, they can heal our society. Teachers are the only ones who can boost their profession by shunning unethical standards and living by ethical conducts in faithfulness to the word of God. It is quite necessary that teachers live by the tenets of their profession and the word of God for a better, egalitarian and prosperous society. Without ethical mentorship, teacher professionalism in the true sense cannot be actualized.

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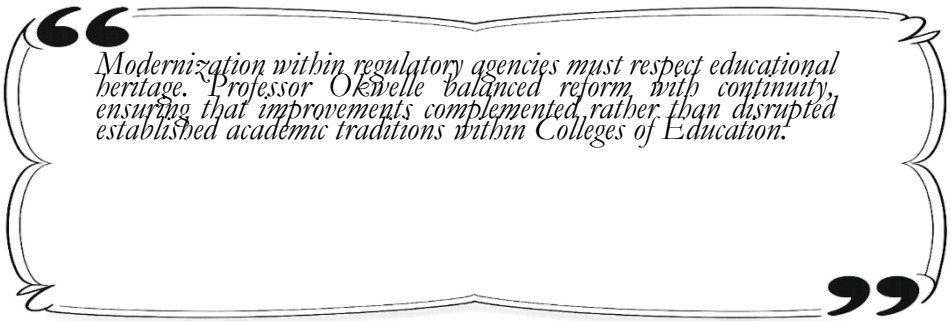
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PART FIVE

From Digital Tools to Intelligent Futures: ICT, AI, and Transformative Technology

> *"We must prepare our young people not merely to consume technology, but to shape it with creativity, critical insight and ethical understanding, for only then can we transform our society and economy in this AI-driven age."*
>
> ***Emmanuel Abu***

Part Five, "From Digital Tools to Intelligent Futures: ICT, AI, and Transformative Technology," explores one of the most defining forces of the contemporary age—the rapid evolution of digital technologies and artificial intelligence, and their profound implications for education, society, and economic development. In an era where technology shapes how we learn, work, communicate, and govern, the central challenge is no longer access alone, but purposeful, creative, and ethical engagement with digital innovation. Echoing the insight that young people must be empowered not merely to consume technology but to actively shape it, this part positions ICT and AI as powerful instruments for human advancement rather than passive automation. It interrogates how digital tools can be transformed into intelligent systems that foster critical thinking, creativity, problem-solving, and responsible citizenship. More importantly, it highlights the urgent need to prepare learners who can navigate technological complexity with competence, conscience, and confidence. This section critically examines emerging trends in ICT and artificial intelligence, their applications in education and the wider economy, and the opportunities they present for inclusive growth and sustainable development. It also confronts pressing concerns, digital inequality, ethical dilemmas, skills gaps, and policy challenges, offering forward-looking insights and transformative pathways. Ultimately, Part Five reaffirms that technology becomes truly transformative only

when guided by human values, visionary leadership, and an education system committed to shaping intelligent futures for individuals, institutions, and nations.

Professor Paulinus Chijioke Okwelle is a distinguished educationist, administrator, shining example, celebrated for his impactful, transformative leadership, scholarly contributions, and unrelenting commitment to education particularly vocational, and technical education, inspiring countless educators and learners, leaving a lasting impact on Nigeria's National Council for colleges of Education (NCCE) and the general educational system in Nigeria.

Imo Joy Mene Omenogo

Chapter 29

Role Of Artificial Intelligence in The Contemporary 21st Century's Academic Standards and Quality Assurance

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Abstract

In November 2022, the ChatGPT - artificial intelligence (AI) was developed by OpenAI. Since this period, AI has attracted widespread attention, currently being used virtually in all works of life, including home chores, industrial applications, and educational prompts. Educators practice their use for improved instruction and innovative solicitations. Its use has become a household ideal for engineering practices and advancement. In this recognition, this paper explored the significance of AI in education and highlighted the avenues that would warrant its incorporation in Nigerian education system.

Keywords: *ChatGPT, Artificial intelligence (AI), OpenAI, AI development, Industrial applications, home applications, educational prompts*

Introduction

Education sector is currently witnessing a significant introduction of artificial intelligence (AI) in the teaching and learning processes. This advancement in technology causes rapid changes in methodologies and learning process. The changes also affect various aspects of education, enhancing quality and standards, and encouraging innovation characterized by technological process in ways of executing classroom tasks (Harry, 2023). These revolutionary incubations in education have impacted on the systems so much to say that the educators, policymakers, researchers, and stakeholders in education have begun to recognize the importance of integrating ChatGPT into educational settings.

ChatGPT is an advanced AI system that utilizes in-depth learning and thorough smart algorithms to perform language related tasks (AlAli and Wardat, 2023). ChatGPT has the capability to provide both healthy students and those with disabilities with enabling environment for optimum accessibility in education for skills acquisition. It showcases the transformative potential of AI in education and highlights the increasing interest in exploring its applications and impact in various educational realm (theory and practical). ChatGPT signifies a significant paradigm shift in how the education sector is currently perceived by all stakeholders giving directions on measures to adopt for productive educational output in the knowledge economy.

One among the impressive attributes of ChatGPT is that it serves as a conversational AI chatbot model (Halaweh, 2023), engaging users in text-based dialogues (Harry, 2023 ; Atuhaire, 2022). It operates as an AI agent that possesses the ability to comprehend and generate human-like passages or text (Adiguzel et al, 2023; Pavlik, 2023).

According to Hack and Knight (2023), ChatGPT is the first text generation programme that can adapt to users' writing models or styles, allowing for coherent conversations that are rooted in linguistic composure and contextual knowledge (Gilson et al, 2023). In this capacity, ChatGPT has such unique quality that utilizes sophisticated learning techniques that are most like human language (*accent and phonics*). AlAli and Wardat (2024) assert that the integration of ChatGPT into educational settings has the potential to revolutionize the traditional teaching methods. It could assist teachers in creating lesson plans that are tailored to individual learner needs, with reasonable emphasis on their learning preferences and abilities.

This paper explored the potential of artificial intelligence, highlighting the values that should necessitate its inclusion in the country's educational system for quality assurance in the 21st century.

Brief Reflection on the Past

In 1983, Nigeria instituted the 6-3-3-4 system of education: giving 6years primary school education, 3years junior secondary school education, 3years senior secondary school education, and 4years university education. The primary objective was to meet the educational needs of its citizenry and equip the youths with sellable skills that will make them become self-reliant.

With increased demand for a skilled labour economy, pressure was placed on the 6-3-3-4 system that required further reform on the system. As a result, Nigeria changed from 6-3-3-4 system to the current 9-3-4 system. This is to create a universal basic education (UBE) for the school age going Nigerian child. The 9-3-4 system was created by merging primary school education (6years) with junior secondary school education (3years) to make 9years of compulsory uninterrupted basic education. This is to improve access to basic education and reduce rate of dropouts and equip youths

with occupational and vocational skills for self-reliance and achieve national goals like the Millennium Development Goals (MDGs).

This reform became necessary to enable the country to address the perceived inadequacies of the previous system. These efforts have been made in search of a convincing system that would give the country a befitting education standard and quality, with confidence built on the products. A system its products(academics) would be globally competent and capable of navigating through multiple economic and political systems for both domestic growth and intellectual capital migration around the globe.

ChatGPT and Quality Education

The ChatGPT is an automated machine configured to act like humans, called artificial intelligence (AI). The machines could be used to perform any duty that human beings can do. Being automated, greater reliability is created and assured than if the same volume of work is kept for human attention and management. For example, AI can automate the grading and assessment process concerning students (Harry, 2023) and instantly provide feedback to students (AlAli & Wardat, 2024).

The feedback in most cases is made in the language familiar to students. It answers questions, creates and generates texts, and can translate languages for ease of the user. AI comprehends the contextual nuances of human language, aiding the learner to overcome possible difficulties in language comprehension. In this wise, AI facilitates personalized instruction through speech-to-text and text-to-speech enablement (Falode & Mohammed, 2023). AI algorithms can analyze students' work, quantify them based on existing guide or rule, and provide feedback. As such, a set standard cannot be compromised or manipulated.

Significance of AI in Education Standards

AI is the technology by which machines could simulate human intelligence and cognitive functions such as; decision making, problem-solving, and understanding language. The AI configured systems could perceive their environment, analyze the environment, process data therein (AlAli et al, 2023), synthesize the data into meaningful outcome, and hence take actions to achieve predetermined set goals (Harry, 2023). As such, machines are thus enabled to perform tasks that typically require human brain reasoning.

AI is, therefore, the building of smart machines that can reason, learn, and act in ways that humans consider intelligent. With the automation of machines to typically act or behave like humans, it is, therefore, assumed that standards are built on a trustworthy platform or basis, removing fears of sub-standards and bias. Elements of unequal treatment among students' academic achievements are not suspected or nursed. Students' academic grading is accepted on mundane level (Yeruva, 2023),

and the measure of one's ability remains a true verdict of the individual's ability without a reasonable doubt (Harry, 2023; Jarrah et al, 2022).

In other words, it implies that learners' academic performance, and consequently the grading presents the true and real picture of the individuals' ability. In a situation where there is need for employment, doubts may not be entertained in respect to the number of personnel who are qualified for the job space.

For example, in late 70s and early 80s, job spaces in technical establishments and the oil and gas industries were occupied based on requests from the industries and recommendations supplied by the unit Heads and Head Teachers (Principals) of Government Technical Colleges (GTCs) in Nigeria. At such recommendations, the oil and gas industries in the country never regretted the choices of the GTC graduates selected and submitted for employment. Then the number of potential and qualified graduates were few such that foreigners were hired for job spaces in Nigeria.

Currently, the number of graduates seeking employment in a few job spaces is enormous. Owing to factors, such as human error, it may be difficult to give reliable assessment when many students are involved. This situation demands a relief aid for quicker and consistent disposals of human assessment without bias but established on quality set standards. With automated activities configured in machines, this objective will be achieved.

Thus, implementing AI system in the students' classroom activities ensures that both appropriate and accurate measures are taken for the singular aim of producing globally competent academics (Stoica & Wardat, 2021) and who are nurtured in confirmed global standards, legitimacy and assured academic quality (Wardat et al, 2022). In this canopy, it is most likely to produce a team of experts and academic professionals that are versatile for the country's competitive development and growth.

Benefits of AI in Education

AI has the potential to regulate classroom activities, encourage teaching and learning tasks, and automate the frequently occurred teacher engagements. Such tasks include students grading, computation of results and some other repetitive administrative duties. In this manner, the teachers and educators could find some time to attend to other pressing needs for the welfare of the students.

AI can enhance expanded horizon of accessibility in education. It can assist students with disabilities by providing speech-to-text and text-to-speech functionalities, enabling them to participate more effectively in learning activities (AlAl & Wardat, 2024). It has the capability to provide students with interactive learning experiences. For example, Chatbot can make learning arena livelier by creating fun for positive interaction among students using teaching aids familiar to them.

Conclusion

Although there are reasons for advocating the incorporation of AI in education, there are also some challenges that need to be addressed. The cost of implementation is a factor to consider, and the system should guarantee appropriate measures to protect the learners' privacy in the course to ensure adequate knowledge impartation to the learners.

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Chapter 30

Institutional Digital Investments for Achieving Sustainable Generational Employability in Rivers State Universities

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&

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Abstract

The quantitative study examined institutional digital investments for achieving sustainable generational employability in Rivers State Universities. In achieving the main objectives two domains of institutional digital investments – learning technologies and human capacity development were studied to determine their impact on the development of future employability of graduates. The population comprises of 23 academic head of departments, 58 lecturers, 130 postgraduate students of 2024 /2025 academic session giving total of 211 respondents obtained from two state owned universities. The manageable population was equally adopted as study sample and used in this study. Instrument for systematic data collection was a structured questionnaire titled "Institutional Digital Investments and Generational Employability" (IDIGE) organized into 12-item questionnaire in five rating scale. Internal consistency of the instrument was determined by the administration of questionnaire to 10 lecturers and 20 postgraduate students using test re-test method for interval of two weeks in Niger Delta University, Amassoma, Bayelsa State, Nigeria and reliability quotients of 0.85 was obtained which further established the consistency of the instrument to measure its predetermined intentions. SPSS tools-descriptive statistics and independent sample test were employed for the analyses. The analytical results had revealed high Levene's F-value for equality of variances indicating a significant difference between the two independent groups. This further suggests the violation of the assumption of homogeneity of variances. It was thus recommended among others, management of universities should develop digital policies and fund them in order to create digital induced techno-environments to heighten students learning engagements and thereby prepare themselves for technology-focused labour markets.

Keywords: *Institutional digital investments, Learning Technologies, Human capacity Development, sustainable, Employability*

Introduction

The transition from traditional education to digital education creates inclusivity and a robust learning environment. In recent times, digitalization and Artificial Intelligence and other various tools are fundamental technologies that have revolutionized and transformed education from traditional approach to contemporary methodological approach to teaching

and learning. According to Ebom-Jebose (2025) the digital era, the demand for advanced digital skills has surged which makes digital literacy a fundamental requirement for employability and economic growth. The study also found that digital skills education not only drive sustainable development but greatly reduced unemployment in a digital economy. Currently, industries have increasingly adopts automation, artificial intelligence, and digital transformation, traditional job roles are being reshaped, necessitating continuous upskilling and reskilling. Acquisition and integration of cconceptual models digital transformation is vital to universities and business schools to gain sustainability amid rapid technological changes. Digital technologies facilitate the purpose of universities which is to be learning organisations. Digital technologies as part of the asset base which enable universities to become democratic learning organisations that prepare globally acceptable, and employable new generation army of graduate-employees (Okubo, Jiahua & Onari, 2000; Rikken, Janssen & Kwee, 2019; Du Toit & Verhoef, 2018, Angieri et al., 2020). Different institutions in modern economies are deeply involved in large-scale investments in provision of digital infrastructure and technologies in pursuit of institutional goals. Institutional digital investment is key driver of organizational competitiveness, workforce transformation, and long-term employability in the digital economy. Conceptually, it can also be seen as an intentional, large-scale allocation of financial resources by institutional managers, governments, universities, corporations and financial bodies for the provision of digital infrastructures, platforms, systems, and human capital development to enhance productivity, innovation and labour market outcomes. Institutional bodies acquire digital technologies, digital assets and digital-enabled systems for skill development as a major part of their strategic investment. Similarly, investment in this context, symbolized those digital technologies and digital assets which may include Artificial Intelligence (AI), cloud computing, big data analytics, blockchain, internet of things (IoT) and other important digital systems vital for preparing sought –after professionals in universities. Digital investments is a strategic allocation of financial, technological and human resources toward digital infrastructures, learning technologies and skills development systems that equip individuals with generational high-demand competencies required in contemporary and future labour markets. It is actually an intentional effort to align education, training and workforce development with rapid technological change, evolving industry needs and global competitiveness. As Vial (2019) had pointed out in digital economies era,

professional value constant appreciation is determined by adaptive skills, technological proficiency and continuous learning capacity rather than static qualifications.

Thus, digitalization therefore bestowed on individual learners the responsibility to upgrade and undertake capability-building mechanism in order to remain relevant and become transformed professionals who are highly sought-after and labour ready across various sectors. However, some researchers have equally decried the paucity of practical, implementable and simple digital transformational models combining technologies, system and educational phenomena (Mohamed, Issam & Robin, 2022). Digital technologies have also generated new competency requirements that are insufficiently addressed by existing formal education systems and corporate training initiatives (Colombari & Neirotti, 2022). Ebom-Jebose (2025) caution that without these digital infrastructure and optic-cable, artificial intelligence competencies in universities, employability prospects decline significantly in the digital economy. This also requires workers having competencies in digital communication, problem-solving, and data technologies. The impact of digitalisation is particularly pronounced in front-line and middle-skill occupations that typically rely on technical qualifications and experiential learning. Since is a growing and niche domain, there is paucity for (a) research knowledge, (b) conceptual model and (c) measuring the accumulated impact and (d) grounding, determining and normalizing the applicability of digital transformation capabilities. In addition, the academic literature still lacks a comprehensive understanding of the impacts of these technologies in human resource management (HRM) at organisational and individual levels from the perspective of sustainable employability (Ali & Lapo. 2025). These critical submissions require significant research collaboration specifically to fill identified gaps in order to explore the role institutional digital investments could play in enhancing digital learning technologies and human capability development as critical aspects towards achieving sustainable generational employable future graduates. Once universities recognize the digital transformational capabilities, then they could transform into operational effectiveness, which is vital to their business survival and continuity. Technological transformation has been found to revolutionize and anticipate a major influence on global education and employability. Digital transformation, defined as the adoption and application of emerging digital technologies, is becoming a growing trend. Employability has today assumed unusual priority and increasingly become a major issue of concern facing both emerging, developing economies and mostly universities. International businesses places much demand on higher education to produce priceless managers who can work in multicultural environments. This is because labour market is both cultural specific and discipline specific and employers are more interested to hire graduates that have cultural background and bilingual experience having no inhibition to work in any country in the world (Ikpesu, 2023). Employers currently

are looking for adaptable employees whose skills are beyond the technical (Maxwell, 2010). Digitalization creates new market opportunities for organizations by refining the organizational value chain. How universities are going to react and capitalize on the market opportunities using sustainable digital transformation capabilities is regional, technology-driven, trend depended and associated with many other factors but not limited to universities' vision and business strategy. The factors influencing digital transformations are rapidly changing, the propelling forces such as artificial intelligence, big data, cloud computing and the internet of things are increasingly changing the landscape of digitalization (Bican and Brem, 2020; Abad-Segura et al., 2020; Akhmetshin et al., 2020), thus, universities are today responding to these changes using a combination of technologies through institutional digital investments to achieve sustainable digital transformation by engaging in rigorous research, specifically to identify new implementable conceptual models and form new knowledge. Such investment is strategically important for the acquisition and integration of digital technologies to strengthen their employability contents. Therefore, harvesting their consequential benefits or gains which include the potential to enhance employees' organisational commitment, job satisfaction and workplace engagement by shaping behavioural patterns and motivational drivers (Silic et al., 2020), thereby contributing to reduced turnover rates (Kretschmer & Palumbo, 2020). Digitalization of education not only determines and normalizes the applicability of digital transformation capabilities but also anticipate its major influence on global education.

Digital education promotes virtual reality, online education, integration of WI-FI and other important learning platforms to boost learning engagement among students at different levels. Digital investments are key enablers of future skills development that employers earnestly demand, which include digital literacy, data analysis, problem-solving, collaboration, creativity and technological adaptability. Empirical evidence has revealed that individuals with intermediate to advanced digital skills enjoy higher employment rates, better job mobility and stronger wage outcomes. These factors make them more competitive in the labour market (Falck et al, 2016, OECD, 2019). These foundational skills aligned with the possible application of digital learning technologies vital for achieving professional readiness. Thus, investments in digital learning platforms, simulations, virtual laboratories, AI – supported tutoring systems and learning management systems boost professional preparedness through the activation of practice-based and competency-based learning. Such learning environment besides instils democratic and cooperative learning attitudes in students it also play decisive role in preparing successive generations for the modern workforce. These technologies expose students to real-world digital environments similar to those used in contemporary workplace. Prominent global body such as (European Commission, 2022) has noted that technologies allow learners to engage in real-world problem-solving, scenario-based

training, and collaborative digital work, which closely mirrors modern professional environments. Through adaptive platforms –driven by Artificial Intelligence, students acquire critical thinking and problem –solving skills, data interpretation and decision-making abilities and digital collaboration and remote –working competencies. Such alignment ensures that graduates are academically qualified and industry-ready, capable of transitioning smoothly into technology –intensive sectors. However, younger generations earlier exposure to digital learning environments mirror the realities of hybrid workspaces, automation, and globalized employment systems and thus enhancing employability and long-term career adaptability. This scholarly understanding of the construct is aligned with two basic interrelated theoretical foundations such as technology acceptance theory and human capital theory. Technology acceptance theory explains how digital investments translate into employability outcomes through effective adoption and integration. The theory places emphasis on its usefulness and ease of use. It is alleged that institutional digital investments that ignores human and social dimensions often fail to deliver employability benefits. While on the other hand, investments that incorporate training, organizational redesign, and user-centered systems produce sustainable professional competencies and workforce engagement. Digital learning environments foster self-directed learning, career confidence, and adaptability. These competencies are critical attributes of sought –after professionals in volatile labour markets (Van Laar et al, 2020). Again, digital investment is conceptually linked to work-readiness and professional agility and lifelong professional relevance. Presently, we live and work in high level knowledge-driven economies, being a sought-after professional demand that we continuously commit ourselves to skill renewal, upskilling, and reskilling throughout our career lives. Learning is a democratic and co-operative activity, delving into academic disciplines, linking them, stretching beyond individual universities into local and global society. Lifelong learning provides access to scalable, flexible and accessible training opportunities that are ongoing upskilling and reskilling throughout our working lives (De Vos et al, 2020). &&&OECD, 2021, UNESCO, 2023 in Akpomi & Ikpesu (2025) integrating AI in education fosters a sustainable learning environment where all categories of students are equipped with relevant digital and business competencies for future workplaces. AI is an inclusive driven technology that activates adaptive learning systems, predictive analytics, and intelligent tutoring systems. In most cases, adaptive learning platforms such as AI-enabled Learning Management Systems (LMS) uses algorithms to tailor educational content to learners' needs, pace, and performance (Holmes et al, 2022). AI-adaptive learning systems (AI-ALS) –a class of intelligent tutoring and a platform that personalize practice, provide scaffolding that fades as learners' master material. Adaptive learning system also incorporates metacognitive prompts and spaced and support long-term retention and transfer. Latest meta-analyses and systematic reviews show robust intelligent tutoring system effects on learning outcomes and growing evidence

that AI-driven adaptive systems significantly contributes to sustainable educational change when supported with curricular and teacher-mediated ecosystems. In addition, with the introduction of digital technologies, employees are experiencing heightened career insecurity, with fewer opportunities for progression (Duggan et al., 2022; Spurk et al., 2022) and demand for more upskilling (Jaiswal et al., 2023). These technologies have also brought stress in the form of techno-stressors, for instance, constant connectivity with the workplace, which has blurred the desired boundaries between work and personal life, can lead to burnout and depressive symptoms (Cadieux et al., 2021; Chen et al., 2022; Cram et al., 2022; Shevchuk et al., 2019). Scholars have agreed that professionals who continuously update their digital and cognitive skills are better positioned to transition across roles, industries and career stages, maintaining relevance despite technological disruption (Autor, 2015). Digital investment has also been associated with global employability of professionals by enabling participation in digital platforms, remote work and international collaborations. Globalization potently implies borderless, unrestricted work environments where professionals with strong digital competencies gain access to global labour markets, enhancing their attractiveness to employers worldwide (OECD, 2020). Digital knowledge equips professional with irresistible capacity to operate in digital networked, multicultural, and innovative-driven environments. This conceptual understanding also aligned with human capability building, a critical aspect of institutional digital investments in universities in building sustainable generational employability.

Researchers have discovered and interlinked human capacity development to digital investments in universities for producing sustainable generational employable graduates. The main idea behind digital investment is rooted on the notion that continuous training, re-skilling and up-skilling of both students and staff translate into meaningful workforce outcomes rather than unused infrastructure. Digital investment connotes universities prioritizing digital literacy and thus empower multiple generations. The provision of digital technologies enhanced learning and exposes staff to ICT training and re-skilling programmes, digital literacy programmes for students, technical support teams and system administrators and change management and digital leadership training. Available empirical evidence from Zhang, Wang and Shang, Wang (2025) had shown that digital transformation significantly promotes high-quality economic development, both directly and indirectly through human capital investment. This further confirmed that when institutions and regions invest simultaneously in digital systems and workforce skills achieve higher productivity and innovation outcomes in contrast to those investing in technology alone. While supporting the maximization of returns on digital investments @@@Zhao & Chen (2025) found that digital economy development significantly boosts human capital accumulation by restructuring industrial systems and increasing demand for skilled labour. It further implies that digital investments

foster increased attention in education, professional training and lifelong learning, which on the other hand raise labour productivity and economic output (@@Zhao et al 2025). In furtherance of the discourse, Zhou, Sun, Zhu, Feng, Sun & Zhou (2025) had observed that digital innovation influence significantly human capital allocation by attracting high-skilled workers and increasing labour share in enterprises. Their unique findings clearly confirmed the fact that digital investments alter workforce composition in favour of advanced skills, thus generating higher economic returns and organizational competitiveness (Xu et al, 2025). Liu and Huang (2025) had also agreed that improvements in digital infrastructure boost job quality, employment stability and income prospects. This implies that digital systems function as productivity- bolster capital mostly when workers possessed adequate digital competencies. While examining the phenomenon, Kem (2025) equally argued that institutional investment in digital education platforms significantly improves employability, innovation capacity and workforce adaptability. In this context, graduates with strong digital competencies most times demonstrate higher labour market readiness and earnings potential, reinforcing the economic justification for integrating digital learning with human capacity development. While highlighting the importance of digital skills, Martinez-Cerda, Torrent-Sellens, and Gonzalez-Gonzalez (2025) established a positive relationship between digital competencies and employability outcomes. This study associates digital skills development to increased employment probability and supports workforce resilience, also reduces income inequality and amplifies the inclusive economic benefits of digitalization (Li et al, 2024). In technology-driven education, Oluwatobi, Olurinola and Taiwo (2016) provide relevant evidence of ICT investment enhancing human capital development and economic performance in Sub-Saharan Africa, argued that without adequate skills development, digital investments yield limited economic returns. Following this empirical evidence, Adekoya, Ojo and Akinwale (2023) demonstrated that human capital development significantly improves workforce sustainability and innovativeness in Nigerian organizations. Their findings further emphasised that digital investments must be followed by continuous capacity building to achieve long-term economic value.

This study is centered on two major constructs that formed the research questions

1. How do digital learning technologies prepare sustainable generational employable post graduate students?
2. How does human capacity development lead to postgraduate students' sustainable generational employability?

Null Hypotheses

1. There is no significant difference in the mean ratings of postgraduate students in Rivers State University and postgraduate students in Ignatius Ajuru University of Education perception of digital learning technologies and preparing sustainable generational employable graduates in Rivers State.

2. There is no significant difference in the mean ratings of postgraduate students in Rivers State University and postgraduate students in Ignatius Ajuru University of Education perception of human capacity development contribution to graduates' sustainable generational employability in Rivers State.

Methodology

The descriptive survey research design has employed quantitative approach to extract and accumulate data for analytical purposes. This design assists researchers to gather detailed information that reveals some major characteristics of the variables under investigation. It is therefore considered appropriate because it facilitates a systematic collection of data from postgraduate students to determine their perceptions, experiences and assessments of learning technologies and human capability development in relation to generational employability. Descriptive survey designs are often used in educational technology and employability studies to examine relationships among variables without manipulating the research environment. The population comprises of 150 postgraduate students of 2024 /2025 academic session respondents obtained from two state owned universities- specifically Rivers State University and Ignatius Ajuru University of Education. The manageable population was equally sampled and used in this study. The choice of postgraduate students is justified because the postgraduate students represent advanced human capital development beneficiaries and future higher class of skilled workforce. The design used purposive sampling to select institutions that have made observable investments in digital infrastructure especially provision and integration of learning technologies and human capability resources, a critical aspect of institutional digital investments for producing sustainable future employable graduates. Instrument for systematic data collection is organized questionnaire titled "Institutional Digital Investments and Generational Employability" (IDIGE) structured 12-item questionnaire in five rating scale opinion of Strongly Agreed (SAG, 5) Agreed (AG, 4), Disagreed (DA, 3), Strongly Disagreed (SDA, 2) and Not too Sure (NTS, 1). The questionnaire is built around the main variables such as institutional digital investments, learning technologies and human capability development and generational employability. The 12-itmes questionnaire was validated by experienced psychometric professionals in measurement and evaluation unit and one seasoned business educator all in Rivers State University. Internal consistency of the instrument was

determined by the administration of questionnaire to 20 postgraduate students using test re-test method for interval of two weeks in Niger Delta University, Amassoma, Bayelsa State, Nigeria and reliability quotients of 0.85 was obtained which further established the consistency of the instrument to measure what it predetermined intention to measure. Data were finally collected from 124 respondents and analyzed using 124 using Statistical Package for the Social Sciences (SPSS version 25) - descriptive statistics -mean, standard deviation while the hypotheses were analysed using inferential statistics such as ANOVA to compare postgraduate students' perception of the two Universities. This methodological approach has been chosen because of its suitability to determine institutional perspectives of human capital development outcomes of postgraduate students. The design allows for empirical assessment of how digital investments and learning technologies contribute to the production of a digitally competent, adaptable and employable generation of graduates.

Results Presentation

Table 1: **Descriptive Statistics of Respondents' Perceptions of Learning Technologies toward the development of Sustainable Generational Employability**

SN	Questionnaire items Digital Learning Technologies N-124	Mean	Std
1.	Equips students with skills relevant to current and future job markets	2.464	8.903
2.	Development of transferrable digital competencies required across generations	2.213	1.475
3.	Virtual simulations and technology-enabled learning enhances students employability skills	2.971	0.231
4.	It increases students' exposure to technology-driven work environments	2.132	6.629
5.	Digital learning tools foster innovation, creativity and adaptability among learners	3.014	9.927
6.	It bridges generational skill gaps between graduates and labour market expectations	3.151	3.595
	Valid N (list wise) 211		

The above statistical table showed various descriptive mean results of respondents' perceptions of learning technologies towards the development of sustainable generational employability in Rivers State Universities.

Table 2: Independent Samples Test to determine Respondents' Perceptions of Learning Technologies in building students' generational employability.

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	Df	Mean Difference	Std. Error Difference
Postgra-stdts	Equal variances assumed	4.42	.037	209	-1.31929	2.06348
Postgra-Stdts	Equal variances not assumed			132.976	-1.31929	1.76309
Postgra-Stdts	Equal variances assumed	21.95	3.000	209	-1.26663	1.42923
Postgra-Stds	Equal variances not assumed			208.463	-1.26663	1.34367
Postgra Stdts Postgraduate Students	Equal variances assumed	6.285	.013	209	2.40207	9.12766
	Equal variances not assumed			176.117	2.40207	9.27615
Lecturers	Equal variances assumed	7.895	.005	209	3.26497	1.37088
Postgraduate Students	Equall variances not assumed			187.047	3.26497	1.37192
Lecturers	Equal variances assumed	1.107	.294	209	-2.62380	5.02865
Postgraduate Students	Equal variances not assumed			195.050	-2.62380	4.96965
VAR00008	Equal variances assumed	5. 778	.000	209	-.56098	.05315
	Equal variances not assumed			122.000	-.56098	.04493

The two respondents were grouped into lecturers and postgraduate students had revealed high Levene's Test for Equality of Variances indicating a significant difference between the two independent groups. This further suggests that the violation of the assumption of homogeneity of variances.

Table 3: Descriptive Statistics of Respondents' Perceptions of Human Capacity Development

S/N	Item Statement	Mean	Std. Deviation
7	Staff digital competencies improve the quality of employability-focused teaching	2.9716	0.7862
8	Continuous professional development equips lecturers to transmit future-focused skills to different learner generations	2.8199	0.63679
9	Human capital development initiatives support staff adaptability to emerging digital and labour market demands	2.5972	0.58862
10	Digital upskilling of staff enhances mentorship and guidance for students' career development	3.0284	1.09941
11	Institutional training programmes promote intergenerational knowledge transfer and digital competence development	3.5300	0.8523
12	Investment in human capital supports sustainable employability across multiple graduate generations	3.1848	0.78008
	Valid N (listwise)	**211**	

Table 3 showed various descriptive analytical results of respondents' perceptions of the significant impact of human capacity development towards achieving sustainable generational employability in Rivers State Universities.

Table 4: Human Capacity Development Independent Samples Test of Respondents' Perceptions

		Levene's Test for Equality of Variances				
		F	Sig.	Df	Mean Difference	Std. Error Difference
Lecturers	Equal variances assumed	.869	.352	209	-.69198	.09909
Postgraduate Students	Equal variances not assumed			183.606	-.69198	.09966
Lecturers	Equal variances assumed	9.008	.003	209	.17249	.08832
Postgraduate Students	Equal variances not assumed			198.661	.17249	.08672
Lecturers	Equal variances assumed	11.994	.001	209	-.57603	.07210
Postgrad Students	Equal variances not assumed			125.030	-.57603	.07879
Lecturers	Equal variances assumed	18.553	.000	209	-.14625	.15353
Postgrad	Equal variances not assumed			207.315	-.14625	.14748
Lecturers	Equal variances assumed	7.113	.008	209	-.11133	.11903
Postgrad	Equal variances not assumed			207.438	-.11133	.11428

The above statistical table indicates high Levene's Test for Equality of Variances which means that the variances of the groups are significantly different. On the other hand, the results violate the assumption of equal variances of the perceptions of human capacity development towards achieving future employability of graduates.

Discussion of Findings

The empirical evidence indicates significant differences in the perceptions of learning technologies contributing towards achieving future employability in universities. It is obvious that institutional digital investments translate into building skills and developing transferrable digital competencies required across generations thereby making students becoming sought-after professionals in the industries. Through virtual simulations and technology-enabled learning environments they become more marketable, possessing innovation and creativity skills which gainfully prepare them for every viable opportunity for employment. The findings are validated by Prominent global body such as (European Commission, 2022) who noted that technologies allow learners to engage in real-world problem-solving, scenario-based training, and collaborative digital work, which closely mirrors modern professional environments. Through adaptive platforms –driven by Artificial Intelligence, students acquire critical thinking and problem –solving skills, data interpretation and decision-making abilities and digital collaboration and remote –working competencies. Such alignment ensures that graduates are academically qualified and industry-ready, capable of transitioning smoothly into technology –intensive sectors. Also, Martinez-Cerda, Torrent-Sellens, and Gonzalez-Gonzalez (2025) had earlier established a positive relationship between digital competencies and employability outcomes. This study associates digital skills development to increased employment probability and supports workforce resilience, also reduces income inequality and amplifies the inclusive economic benefits of digitalization. Despite the seemingly challenges of heighten career insecurity demand for upskilling and likely techno-stressors and depressive symptoms arising from the introduction of digital technologies, scholars have equally argued that professionals who continuously update their digital and cognitive skills are better positioned to transition across roles, industries and career stages, maintaining relevance despite technological disruption (Autor, 2015).

In another empirical perspective derived from the analytical position of respondents which is focused on human capacity development in achieving future employability. The results highlight statistical differences in the perceptions of the significant contributions of continuous investments on human capital of staff whose competencies improve quality of employability –driven teaching and research. Oftentimes, lecturers are equipped when they are involved in continuous professional development, support staff adaptability to emerging digital work environments and equally enhanced digital upskilling and foster guidance and mentorship. The findings are in agreement with scholars such as Kem (2025) which equally noted that institutional investment in digital education platforms significantly improves employability, innovation capacity and workforce adaptability. Liu and Huang (2025) had also agreed that improvements in digital infrastructure boost job quality, employment stability and income prospects. This implies that digital systems

function as productivity- bolster capital mostly when workers possessed adequate digital competencies. In technology-driven education, Oluwatobi, Olurinola and Taiwo (2016) provide relevant evidence of ICT investment enhancing human capital development and economic performance in Sub-Saharan Africa, argued that without adequate skills development, digital investments yield limited economic returns. Following this empirical evidence, Adekoya, Ojo and Akinwale (2023) demonstrated that human capital development significantly improves workforce sustainability and innovativeness in Nigerian organizations.

Future employability and pursuing professionalism and economic gains could be achieved through adaptive platforms –driven by Artificial Intelligence, students acquire skills relevant to current and future job markets, transferrable valuable digital competencies required across generations, virtual simulations and technology-enabled learning enhances students employability skills, the various digital tools used exposed them to technology similitudes of their workplaces. They have been found to think critically and developed problem –solving skills, data interpretation and decision-making abilities and digital collaboration and remote –working competencies. In addition, such students become high in-demand professionals who can equip while lecturers transmit future –based skills to different future learners thereby making graduates academically qualified and industry-ready.

The multi-diverse purposes of institutional digital investments span beyond digital –driven learning environments, exposure and engagement to real-world problem-solving, scenario –based training and collaborative digital work which reflect modern professional environments preparing them adequately for future employability and pursuing professionalism and economic gains. Through adaptive platforms –driven by Artificial Intelligence, students acquire skills relevant to current and future job markets, transferrable valuable digital competencies required across generations, virtual simulations and technology-enabled learning enhances students employability skills, the various digital tools used exposed them to technology similitudes of their workplaces. They have been found to think critically and developed problem –solving skills, data interpretation and decision-making abilities and digital collaboration and remote –working competencies. In addition, such students become high in-demand professionals who can equip while lecturers transmit future –based skills to different future learners thereby making graduates academically qualified and industry-ready.

Conclusion

The multi-diverse purposes of institutional digital investments span beyond digital –driven learning environments, exposure and engagement to real-world problem-solving, scenario –based training and collaborative digital work which reflect modern professional environments preparing them adequately for future employability and pursuing professionalism and economic gains. Through adaptive

platforms –driven by Artificial Intelligence, students acquire skills relevant to current and future job markets, transferrable valuable digital competencies required across generations, virtual simulations and technology-enabled learning enhances students employability skills, the various digital tools used exposed them to technology similitudes of their workplaces. They have been found to think critically and developed problem –solving skills, data interpretation and decision-making abilities and digital collaboration and remote –working competencies. In addition, such students become high in-demand professionals who can equip while lecturers transmit future –based skills to different future learners thereby making graduates academically qualified and industry-ready.

Recommendations

Empirical evidence though emphasised the importance of institutional digital investments, it is necessary for management of universities to develop digital policies and fund them in order to create digital induced techno-environments to heighten students learning engagements and thereby prepare themselves for technology-focused labour markets.

Continuous investments in staff digital capacity building must top management policies to promote professionalism and equally transmit future –oriented skills to different sets of learners thereby becoming both academically qualified and industry –ready graduates.

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> *Excellence in teacher preparation is the quiet revolution shaping generations yet unborn. The strengthened accreditation and refined oversight under Professor Paulinus Chijioke Okwelle at the NCCE form part of Nigeria's invisible architecture of transformation.*

Chapter 31

Re-Envisioning Teacher Training Through Technology-Driven Pedagogies: A Framework For 21st Century Colleges of Education in Nigeria

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Abstract

This paper examines the imperative of re-envisioning teacher training in Nigeria's Colleges of Education through technology-driven pedagogies suitable for 21st century learning demands. Grounded in the technology, pedagogy and content knowledge (TPACK) model as well as Heutagogy (Self-determined Learning), the paper establishes a theoretical foundation for integrating digital competence, pedagogical innovation and subject mastery in teacher training. It critically reviews the current status of teacher training in Nigeria Colleges of Education, highlighting persistent challenges such as limited digital infrastructure and inadequate professional capacity development. The paper further explores innovative digital tools and strategies including learning management systems; mobile learning applications etc and equally demonstrate their practical applications for transformative teacher training. Potential challenges such as policy gaps, funding constraints, digital inequity are discussed alongside their implications for educational policy and governance. The paper concludes by proposing strategic directions for sustainable implementation, emphasizing coordinated government support, institutional reform and continuous professional development for teacher trainers. Ultimately, the paper advocates a systemic shift towards technology-driven pedagogies as a catalyst for producing adaptable, reflective and globally competent teachers in Nigeria.

Keywords: *Teacher education; Technology-driven pedagogy, TPACK, Heutagogy, Nigeria Colleges of Education.*

Introduction

In the present day society, innovations in science and technology are reshaping every aspect of both human and national endeavors and the education system which stands at the leading edge of this transformation obviously is not left out. During the Covid-19 pandemic, it was obvious that about 90% of learners all over the globe were engaged in some form of digital learning or the other. The situation then helped to underscore the accelerating indispensability of technology in teaching learning processes (UNESCO, 2023). The swift transition obviously highlighted a compelling contradiction; this is because while most classrooms are increasingly adopting technologies, many teacher education institutions especially in yet to be developed countries like Nigeria, remain unmoved and tenaciously held onto traditional pedagogical processes that inadequately prepare prospective educators for 21st century classroom demands.

At the center of contemporary educational reform discourse is the concern of how teacher training can evolve to be able to meet the demands of information driven and digitally connected world. Experts in education are of the opinion that teacher training must move beyond the already out-dated teacher-centered methods and progress towards more dynamic, technology-enhanced teaching and learning that promotes digital literacy, develop critical thinking and collaboration as well as focus on lifelong learning among prospective teachers (Usman, Obisesan & Ifabiyi, 2025)**.** Colleges of Education in Nigeria serve the foundational institutions for training prospective teachers; hence the present debate is apt given the ever increasing roles of information and communication technologies (ICTs) in national curricula and classroom activities. In spite of innovative-education policies being put in place by successive governments, Nigeria teacher education ecosystems have continued to contend with inconsistencies between technological expectations and actual pedagogical practices. This situation therefore tends to create a curricula and professional development gap that threatens educational quality and equity.

The present paper therefore argues that teacher training re-envisioning through technology-driven pedagogies is indispensable for Colleges of Education in Nigeria, if they are actually intended to prepare and produce prospective teachers that have all it takes to thrive in modern learning environment. In specific terms, traditional methods of teaching must be replaced with models that integrate digital tools, pedagogical theories and reflective practices in a cohesive, contextually relevant way. Hence the present paper is of the view that instead of treating technologies as an add-on to pedagogical processes, they must be seen as an essential mediator of teaching, curriculum design and professional identity formation.

Studies and literatures abound that have brought to light, complex standpoints on technology integration in teacher training. Usman, Obisesan and Ifabiyi (2025), showed the transformative potentials of technology in Colleges of Education. They

noted that technologies have the capacity to advance pedagogical approaches as well as improve and match teacher preparation with world standards. They equally call for a resilient infrastructure and strategic policy support to enable the actualization of these benefits. Martins & Blanche (2025) noted that there is duality in technology use in Nigeria because though digital tools have the potentials to enhance and improve pedagogical knowledge, there are inconsistencies in infrastructure, institutional support and training qualities and these factors tend to undermine effective integration and use of these technologies. Moving beyond Nigeria context, global studies have suggested that the Technological Pedagogical Content Knowledge of a teacher is very vital in determining the meaningful integration and use of technologies. It may be obvious that this competence may have remained underdeveloped in Nigeria teachers thereby creating a gap in teacher training programmes. Furthermore, broader international research emphasized that professional development in digital teaching not only improves instructional competencies but also enhances and supports the well being, self efficiency and efficacy of teachers which illustrates the numerous implications of digital learning reforms (Yin, Kuen, Yi, 2025). The above works revealed the prospects of technology-driven teacher training as well as the existing challenges and limitations such as infrastructural deficiencies, dearth of institutional supports among others which must be addressed. However, there are few frameworks that have explicitly linked these challenges with scalable pathways that should be tailored towards Nigeria educational ecosystems and this indicates a clear gap hence the need for a scholarly intervention.

The rationale for the present work is rooted not only in educational but national necessity. Present day Nigeria ever increasing youth population and rising need for digital connectivity requires teachers to be effectively equipped both in subject-matter efficiency but also in pedagogical expertise leveraging on technology for diverse classroom settings. A situation where prospective teachers are prepared and trained without durable technology-enhanced pedagogical expertise stand the risk of perpetuating outdated practices that would fail to prepare and engage future learners for participation in a global digital economy. More so, when technology competencies are advanced among teacher trainers and trainees, there is every possibility that learning outcome would be enhanced, inclusive education would be promoted and there will be drastic reduction in inequities in access to quality education across urban, semi rural and rural locations. The present paper contributes to educational scholarship by offering a conceptual model that puts technology-driven pedagogies at the center of teacher training reform in Nigeria. By breaking down contemporary theory, empirical insights and contextual challenges, the present paper would reveal a clear roadmap for policy makers, teacher educators and institutional leaders seeking to modernize Colleges of Education while also according required respects to local values and resource constraints.

The remaining part of the present paper unfolds as follows: section two focused on relevant theoretical foundations and perspectives for technology-driven pedagogical model. Section three examined the current state of teacher training in Nigeria Colleges of Education identifying teaching and structural gaps. Section four articulated innovative digital tools and strategies for transformative teacher training and section five discussed potential challenges and policy implications while section six concluded with recommendations for research, practice and policy that would re-envision the future of teacher preparation through technology integration.

Theoretical Foundations for Technology-Driven Pedagogical Model

The theoretical model that gives support to the present paper which is focusing on re-envisioning teacher training through technology-driven pedagogies is the **Technology Pedagogical and Content Knowledge (TPACK) model**. The model emphasizes that effective teacher training must develop three connected knowledge domains namely: **Technological Knowledge (TK); Pedagogical knowledge (PK) and Content knowledge (CK).** (Petko, 2025). The model called TPACK stated that if a teacher is able to combine these domains, it will help him/her to design and implement an instructional delivery in which technology not only complement the contents but also the pedagogical processes, thereby fostering adaptive teaching that is well suited for a 21st century classroom environment. In line with TPACK is another theory called the **Heutagogy** or **Self-Determined Learning.** The theory sees learners including teacher-trainees as active agents in their personal professional development (Panta, 2025). The Heutagogy theory underscores autonomy, reflection and capability building which is suggestive of the fact that technology-driven ecosystem has all it takes to support prospective teachers in setting personal goals, solving complex challenges and navigating uncertainties. These factors are in tandem with 21st century requirements for lifelong learning and adaptability which emphasize learner-centeredness and engagement rather than passive reception learners.

TPACK and Heutagogy models position technologies not as mere set of tools but as enablers and serious mediators in pedagogical transformation. With these two models, a technology-driven pedagogy becomes vehicles with which teacher trainers promote critical thinking, reflection, learner autonomy and intentional use of digital resources which are indispensable competencies for teacher training in present day Colleges of Education. By integrating these two models, a supportive platform is created for a holistic and intentional reshaping of teacher knowledge, practices and professional identity in the 21st century (Angel & Benjamin, 2025)

Current State of Teacher Training in Nigeria Colleges of Education

Colleges of Education in Nigeria are teacher training institutions of higher learning that are the foundational components of Nigeria education system. They are saddled

with the responsibilities of producing competent, reflective and skilled teachers that are equipped with the capabilities of navigating classroom complexities and contributing to human and national development. The products of Colleges of Education are trained to teach at the very basic and foundation stage of education which is from Nursery to junior basic levels of education. Colleges of Education in Nigeria are regulated by the National Commission for Colleges of Education (NCCE) and the commission is headed by an Executive Secretary. The NCCE is mandated to prescribe the minimum standards for teacher preparation including pre-service and in-service trainings, curricula delivery and professional development. However, despite the existing policy frameworks, the current state of teacher training in Nigeria reflects perennial challenges across structural, pedagogical, research, policy and monitoring and these factors seriously undermine the quality and relevance of teacher preparation and training in the 21st century.

In the structural dimension, Colleges of Education in Nigeria struggle with challenges of inadequate and in some cases near complete lack of necessary infrastructure and facilities that are necessary for effective training. For instance, many departments in most Nigerian Colleges of Education lack modern facilities such as ICT-driven classrooms, e-libraries, reliable internet connectivity and facilities, electricity, access roads, portable water supply, laboratories, workshops and other such infrastructure that support interactive and technology-driven pedagogy (Usman, Obisesan & Ifabiyi, 2025). It is a known fact that without these vital structural supports, teacher educators are in most cases confined to traditional face-to-face lecture method with its limited potentials to engage learners in any meaningful experiential technology-driven pedagogical practices. There is no doubt that these lacks seriously constrain efficient access to digital learning tools as well as enlarge urban-rural digital divide in teacher training especially where rural institutions are specifically resource constrained and unable to provide equitable training opportunities.

In the area of teaching practices which is one of the most important core courses in teacher training, there are obvious gaps in delivery quality and innovation. Studies have shown that many teacher trainers lack adequate training in innovative and contemporary teaching strategies especially with respect to learner-centered pedagogy, blended learning and integration of ICTs into teaching (Usman et al, 2025). The perceived gap in teacher trainer competencies in most cases translates into prospective teachers entering into the teaching profession with very little or no mastery of modern innovative teaching methods required for diverse classroom environment. More so, mandatory continuous professional developments for teachers are in most cases not readily available and the few available ones are poorly funded. In some cases, the development programmes are disconnected from the essential demands of evolving technologies which leads to stagnation in teaching quality (Eke & Ogechi, 2025).

Colleges of Education are institutions of higher learning that are expected to contribute to quality teacher education scholarships and best practices in research outputs, pedagogical innovations, technology adoption and integration and efficient teaching learning models. However, research findings have revealed that there exist gaps in achieving these functions on the part of the Colleges of Education because of factors such as limited research funding, insufficient mentorship structures for new entrants and researchers, inadequate institutional emphasis on research as part of professional roles etc. This has resulted in outright stagnation or snail-pace in evidence-based advancement in teacher preparation especially as it concerns integration and use of evolving emerging technologies and digital pedagogical processes.

In the area of policy perspective, there are national frameworks put in place to articulate the need for quality teacher training as well as the integration of prerequisite 21st century skills in teacher education programmes and institutions but the problem remains that there are wide spread implementation gaps. Policy documents emphasized ICT integration and use as well as quality assurance strategies but the translation of the framework stipulations into actionable, measurable and sustainable programmes in most cases is incongruent with that of the policy framework. Furthermore, teacher certification enforcement and compliance checks, though strengthened in recent years through the actions of the Teachers' Registration Council of Nigeria (TRCN), still fail to incorporate depth in pedagogical and technological competencies. This situation obviously would result in mismatch between policy aspirations and actual professional preparedness among graduating student-teachers.

In the area of monitoring and evaluation, it is sad to note that though the available mechanisms ought to have ensured quality and accountability in teacher education, there exist some perceived weaknesses. Although regulatory bodies such as National Commission for Colleges of Education (NCCE) are charged with periodic accreditation and evaluation of programmes in teacher training institutions especially Colleges of Education, there still exist some systemic problems such as limited human capacity, reduced institutional autonomy, bureaucratic hurdles, poor funding, poor infrastructure etc that hamper and constrain effective functioning. In most cases, the monitoring activities carried out are not undertaken as often as it ought to be and this situation reduces their expected impact on improving outcomes and adaptation to new and innovative pedagogical models.

The current state of Colleges of Education and teacher training in Nigeria show clear structural, teaching, research, policy and monitoring gaps that are unfriendly as well as poses serious challenges to preparation and training of prospective teachers for 21st century classrooms especially in Nigeria. Be that as it may, it is worthy to note that structural resource constraints militate against the effective adoption of

technology-driven pedagogies, makes teaching practices remain eternally grounded in outdated methods due to insufficient professional development. Again, when there is insufficient professional development, institutional research contributions become limited, policy implementation falls short of articulated goals and monitoring models lack the desired agility to drive systemic improvements. To close these gaps therefore requires an intentional efforts by government agencies like NCCE, policy makers, institutional managers and stake holders to re-envision as well as reform teacher training systems to ensure that teacher preparatory programmes are not only responsive to contemporary educational demands but must be in alignment with emerging technological frontiers..

Innovative Digital Tools and Strategies for Transformative Teacher Training

There is no over emphasizing the fact that innovative digital tools and strategies have the potentials to offer operational and sustainable pathways for transforming pre-service and in-service training in Nigeria. This can be achieved through matching pedagogy with the provision of contemporary information and communication technologies. An intentional approach to this all important feat requires three main components or elements namely:

1. Selection of Evidence-based tools such as learning management systems (LLS), Mobile learning applications, Open educational resources (OER) and data analytics platforms.
2. Putting in place locally appropriate pedagogical designs such as blended and flipped models, micro-credentialling and peer-coaching mediated by digital platforms and
3. Providing systemic supports such as connectivity, devices and sustained professional development.

The above three components when put together has the ability to create a conducive environment through which digital tools would transform teacher preparation from content delivery approaches to ongoing practice-oriented professional development (UNICEF, 2025).

Practical Tools and How They Are Used

Here are few practical tools and how they can be used for teacher training.

1. Learning management systems such as Moodle, Google Classroom which can provide centralized classroom environments or platforms for course materials, formative assessments and analytics for documenting student-teachers' growth. When these tools are combined with structured peer-review tasks, they have all it takes to promote reflective practices and evidence-based feedback cycles.

2. Mobile Learning Tools (M-Learning tools): This has the ability to leverage the high penetration of mobile phones in Nigeria to deliver short, scaffolded professional development modules, real-time classroom coaching videos and Short messages services (SMS) reminders that helps to sustain transfer of learning into practices (Ekwu, 2025).
3. Open Educational resources that help to reduce costs and accelerate curriculum updates
4. Simple data dashboards which enable teacher trainers to track competencies that is digital literacy, formative assessment skills etc across co 9JA programme reported traininghorts and other targeted remedial supports (Usman et al, 2025).

Recent national and programmatic data have shown that scaled digital initiative has the ability to produce measurable outcomes when implementation is intentional and taken seriously with all intent and purpose. For instance the **UNICEF GenU 9JA** training of approximately 63,000 teachers and education officers in digital skills; connection of over 1,000 schools to INTERNET and rapid growth of a national learning platform from approximately 117,000 to more than 750,000 registered users between 2022-2023 is a clear evidence that capacity building combined with appropriate infrastructure can yield broad reach and uptake. Furthermore, empirical studies within Nigeria has equally evidenced that there is positive correlation between mobile/blended interventions and gains in teacher knowledge, engagement and in some cases, learner outcomes although the sizes of effects vary as a result of contexts and fidelity of use (Ekwu, 2025; UNICEF, 2025)

Potential Challenges and Policy Implications of Technology-Driven Pedagogies

The implementation of technology-driven pedagogies for teacher training in Nigeria Colleges of Education is faced with various challenges that are both structural and systemic. Despite worldwide calls for technological transformation of education sectors and processes, the glaring practical fact is that many Colleges of Education in Nigeria are still battling with significant gaps created by challenges that have direct implications for the development, adoption and scaling of innovative practices that are vital in preparing prospective teachers for 21st century classrooms.

One of the primary challenges lies in infrastructural lack and inadequacy. According to Nwobodo and Udoka 2025, Nigerian educational ecosystem revealed that Colleges of Education in Nigeria lack reliable electricity, stable internet connectivity and sufficient ICT equipment. These lacks have severely limited teacher trainers' ability to integrate digital pedagogies into teaching learning activities. Their findings mirror national patterns in which public schools across Nigeria struggle with basic

ICT provisions which points to broader systemic deficits those teacher education institutions cannot overcome on their own.

Closely related to infrastructural lack is the challenge of lack of digital literacy and professional competence among teacher trainers and their trainees. Ugbor and Wordu (2025) in their studies noted that a considerable number of teachers have limited or no exposure to digital tools and pedagogical strategies required for effective technology integration. The challenge of literacy deficiency definitely reduces confidence on the part of teachers in using digital platforms and this would result in uneven adoption of blended and other online instructional models even where such tools are in existence or available. This simple implication is that educators would lack updated teaching models required to support meaningful utilization of technology thereby confining technology to supplementary roles instead of catalysts for constructive learner-centered pedagogy.

There is also the persistent challenge of institutional resistance to change which stems from an entrenched traditional pedagogical practices. Many teachers and administrators especially in Colleges of Education are tenaciously holding unto conventional analogue methods of instruction and assessment, perceiving educational technologies as disruptive as well as a big burden. This resistance is further complicated by inadequate continuous professional development opportunities which invariably limit teachers' ability to change their instructional practices and to harness digital tools for enhanced pedagogical outcomes. Any policy that mandates technology integration without an accompanying capacity building strategies would surely suffer the problem of reinforcing superficial compliance rather than substantive pedagogical transformation (Ogwo, 2025).

There is also the challenge of policy coherence and implementation gaps. Although Nigeria's national Policy on Information and Communication Technologies (ICT) in education articulates strategic intents to build ICT capacity, establish infrastructure as well as ensure regular trainings, many of the provisions have not actually been translated into effective implementation at institutional levels. Most Colleges of Education still struggles with fragmented policy guidance, limited monitoring mechanisms and inadequate funding for ICT initiative. This problem definitely has led to uneven application of technology frameworks across Colleges. The existing gap between policy design and institutional practices further call attention to the need for stronger and intentional governance, systematic monitoring and evaluation as well as clear implementation guidelines that take into account the specific contexts of teacher education (FME, 2019).

Another challenge facing Technology-driven pedagogies in Nigeria Colleges of Education is equity and access concerns. This is a significant challenge that has serious implications for technology-driven pedagogies. Differences in access to ICT facilities between urban, semi-rural and rural Colleges of Education escalate existing

inequalities in teacher training quality. Rural institutions in most cases frequently encounter more severe infrastructural constraints and lower access to digital training resources compared to their urban counterparts (Lubabatu & Hadiza, 2025). These existing disparities would not only hinder professional growth of teachers in the affected locations but would also contribute to an unending digital divide that endangers national goals for inclusive education.

The above challenges have policy implications emanating from them and which call for a holistic context-sensitive approach to institutionalizing technology in teacher training. Policy makers must make intentional investments in infrastructure and bandwidths a top priority especially at institutional levels. The said investment must be accompanied with extensive Continuous Professional Development (CPD) Programmes that must be specifically tailored for teacher trainers. Again, matching policy frameworks with clear implementation pathways, accountability mechanisms and sustainable funding models are indispensable factors for bridging the gaps between policy rhetoric and pedagogical practices. Finally, systemic supports for digital literacy initiatives should be situated within national digital skills acquisition strategies which would help to strengthen teachers especially their capacity to integrate and implement technology-driven pedagogies that are effectively equitable, innovative and relevant to Nigeria's educational development goals.

Conclusion

The present article advances a central position of argument that re-envisioning teacher training through technology-driven pedagogies is no longer optional but imperative foor positioning Colleges of Education in Nigeria in a pride of place that will enable them to meet the demands of the 21st century teaching and learning. By putting forward a context-responsive model, the study highlights the strategic integration of digital tools, innovative pedagogies and institutional support systems as scalable pathways for transforming teacher training and advancing instructional relevance, quality and equity.

The implications of the present position paper are significant for theory, practice and teacher education programmes. Theoretically, the framework contributes to ongoing discourse on technology-enhanced pedagogy by situating digital integration within the sociocultural and infrastructural realities of teacher education in Nigeria. Practically, it offers a structure that would guide policy makers, institutional leaders and teacher trainers who desire to implement sustainable technology-enhanced reforms that are in tandem with local needs while also meeting worldwide standards. For teacher training programme, the framework emphasizes the development of technologically competent, reflective and adaptable teachers that are capable of intentionally leveraging digital tools to support learner-centered and inclusive lifelong pedagogical practices.

In summary, the present study is in agreement that intentional contextually grounded adoption of technology-driven pedagogies holds efficiently transformative potentials for Colleges of Education in Nigeria. Accepting and upholding this re-envisioned approach has the potentials to strengthen teacher training system, ensure a future-ready teaching workforce as well as contribute meaningfully to national educational development in an ever increasingly emerging digital world.

Suggestions on Ways Forward

Based on the position of this paper, the following suggestions are put forward:

1. Government should invest in national digital infrastructure, policy coherence and sustained funding to help institutionalize technology-driven teacher training.
2. Institutions should redesign curricula, integrate blended learning models and provide continuous professional development for staff at different levels both teaching and non teaching.
3. Lectures should adopt innovative digital pedagogies; engage in lifelong learning and model reflective, learner-centered practices. They should also establish peer learning communities that focus on using educational technologies for inquiry and sharing of reflective teaching strategies.
4. There is need to integrate educational technologies in lesson planning for instance virtual simulations, collaborative platforms, to help design inquiry-driven and learner-centered lessons.

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> *"Institutional accountability is the spine of credible education. Through principled oversight at the NCCE, Professor Paulinus Chijioke Okwelle reinforced that spine, ensuring resilience within the Colleges of Education system."*

Chapter 32

Using Artificial Intelligence to Foster Inclusive Literature Classrooms for Students with Learning Difficulties

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Abstract

Inclusive education has become a central concern in contemporary pedagogy, particularly in literature classrooms where reading, interpretation and critical analysis present significant challenges for students with learning difficulties. Artificial intelligence (AI) offers transformative possibilities for addressing these challenges by enabling personalised learning, multimodal content delivery, adaptive scaffolding and continuous formative feedback. This paper examines the theoretical foundations, pedagogical applications and ethical implications of using AI to foster inclusive literature classrooms for students with learning difficulties. The paper argues that AI can significantly enhance access, engagement and achievement in literature education when thoughtfully integrated. The study further outlines practical classroom strategies, assessment approaches and policy-oriented recommendations for educators and institutions committed to inclusive and equitable learning.

Keywords: *Artificial intelligence, Inclusive education, Literature teaching, Learning difficulties, Formative assessment.*

Introduction

Literature education occupies a central place in formal schooling because it supports a broad constellation of intellectual, linguistic, cultural and affective outcomes. Through consistent exposure to literary texts, students gain higher-order abilities

including interpretation, inference, critical reasoning and evaluative judgment in addition to developing linguistic competence in reading, writing and vocal communication. Literature develops cultural understanding by exposing kids to a variety of histories, values and worldviews. It also develops emotional intelligence by promoting empathy, introspection and ethical imagination. Literature classrooms are essential places for social understanding and personal development because, as Rosenblatt's (1978) transactional theory of reading highlights, meaning in literature develops through an active interaction between reader and text.

Traditional methods of teaching literature frequently rely on pedagogical presumptions that favour a limited profile of learner ability, despite these transformative potentials. Conventional literature classes usually place a strong emphasis on long written essays that must be finished on time, silent independent reading of complex works and class discussions that are fueled by quick verbal responses. Students who engage in such activities typically gain proficient decoding abilities, robust working memory, prolonged focus and ease with traditional academic writing. Because instructional and assessment practices confuse access skills with understanding, learners with learning difficulties, such as dyslexia, dysgraphia, attention-deficit/hyperactivity disorder (ADHD) and language processing disorders, are often at a disadvantage, not because they lack intellectual capacity or interpretive insight (Shaywitz, 2003; Snowling, 2013). Literary language with deep narrative patterns, symbolic ambiguity, archaic grammar and figurative idioms might constitute an exclusionary fence rather than an invitation to understanding for these kids. Such isolation has serious repercussions. Even when they have good oral reasoning abilities or rich interpretive views, students with learning disabilities frequently experience persistent frustration, a decreased academic self-concept and disengagement from literature learning (Guthrie & Wigfield, 2000).

These difficulties are exacerbated by traditional assessment techniques, which prioritise speed, spelling accuracy and syntactic correctness over in-depth analysis or creative thinking. In other words, rather than evaluating students' abilities to analyse character motivation, thematic complexity, narrative voice, or sociocultural context, literature classes may unintentionally gauge their ability to handle superficial demands. The objectives of inclusive education, which promote fair participation and meaningful learning for all children, regardless of cognitive or neurological disabilities, are at odds with this mismatch (UNESCO, 2017). Recent developments in artificial intelligence (AI) present intriguing opportunities to tackle these persistent issues and rethink literary education from an inclusive perspective. Advanced text-to-speech systems, adaptive reading and annotation platforms, natural language processing (NLP) tutors, intelligent vocabulary support and automated formative-feedback tools are examples of AI-driven technologies that can adapt to learner variability in a way that traditional print-based pedagogy cannot (Luckin et

al., 2016; Holmes, Bialik, & Fadel, 2019). These technologies make it possible to deliver literary works in a variety of ways (audio, visual and interactive), customize the pace of instruction and offer instantaneous, tailored scaffolding that facilitates understanding and analysis.

From a cognitive standpoint, by assisting with decoding, pronunciation, and transcribing processes, AI technologies can greatly lessen unnecessary cognitive burden for students who struggle with learning (Sweller, 2011). For instance, learners with dyslexia can access complicated literary texts through aural channels while concurrently following synchronized visual highlighting thanks to top-notch AI-powered text-to-speech solutions. According to empirical data, this kind of multimodal assistance enhances comprehension by releasing cognitive resources for more complex meaning formation (Moxley, Tighe, & Wagner, 2018). Similar to this, AI-based text simplification and glossing tools can provide vocabulary support, contextual explanations and optional paraphrases that maintain the essential literary meaning of texts while improving accessibility.

Additionally, AI has a lot of potential for fostering student participation and long-term enthusiasm in literature classes. In order to maintain the best possible balance between challenge and support, adaptive learning systems can analyse learner answers and modify questioning techniques, task complexity, or feedback intensity in real time (Dede, 2014). This responsiveness can help students who have previously repeatedly failed reading assignments develop a sense of competence and agency, both of which are essential for sustained engagement with literature. Also, chat-based tutors and conversational AI technologies can offer low-stakes settings where students practice interpretations, test concepts and get advice without the stress that comes with performing in front of an audience.

Crucially, AI tools can also increase the variety of acceptable methods that students can show that they understand literature. Learners who struggle with writing can express complicated interpretations vocally or in mixed-media formats thanks to speech-to-text technologies, multimodal composition platforms and AI-assisted drafting systems. According to Graham, Harris, and Santangelo (2018), this change brings assessment closer to conceptual comprehension rather than mechanical precision. Such adaptable forms of expression improve validity and inclusivity without reducing academic standards when they are backed by well-crafted rubrics and teacher supervision. However, AI's educational value in literary classes is neither impartial nor automated. To prevent perpetuating injustices or reducing learning to algorithmic efficiency, academics warn that AI must be included into strong educational frameworks (Selwyn, 2019). Teachers continue to play a crucial role as learning designers, facilitators, and moral guardians. In order to foster student independence, they must choose the right tools, contextualize AI-generated feedback, model critical interaction with texts and progressively remove

technological scaffolds. To guarantee that technology enhances rather than replaces human judgment and interpretive discourse, professional development in AI literacy and inclusive education is crucial.

AI has the ability to change literature classrooms from deficit-oriented models of accommodation to strength-based models of inclusion when used carefully. AI can facilitate the development of learning settings so that diversity in cognitive processes is expected and valued, rather than just "helping" students with learning challenges overcome current obstacles. Students with learning disabilities are positioned in these classrooms as active contributors to literary inquiry rather than as peripheral participants. They are able to engage deeply with texts, articulate nuanced interpretations and develop the critical, cultural, and emotional literacies that literature education is uniquely positioned to cultivate.

Inclusive Education and Learning Difficulties

The foundation of inclusive education is the idea of educational equity, which holds that every student has a right to meaningful participation in excellent learning opportunities regardless of their physical, cognitive, or neurological disabilities (UNESCO, 2017). Learner variability is reframed by inclusive education as a normal and anticipated aspect of any classroom, rather than as a shortcoming. According to this paradigm, learning disabilities are thought to have neurodevelopmental roots and impact particular cognitive functions like language processing, working memory, decoding, written expression and attention regulation while maintaining general intelligence (Snowling, 2013; Shaywitz, 2003). This distinction is crucial, especially in literary instruction, where academic achievement is frequently confused with speed and fluency rather than comprehension depth or sophisticated interpretation. As a result, inclusive literature training needs to go beyond standardized pedagogical approaches and adopt learner-centered design, flexibility, and accessibility that prioritises meaning access above text exposure.

Practically speaking, this calls for learning environments that proactively lower obstacles to comprehension and engagement while anticipating a variety of cognitive profiles. If literary schools are to sustain inclusive principles, they must have flexible modes of representation, diverse avenues for involvement and multiple possibilities for proving understanding. These objectives are frequently undermined by traditional "one-size-fits-all" methods that favor certain students while marginalising others, such as the use of long silent reading, a focus solely on written essays and strict pacing. Therefore, inclusive literary pedagogy necessitates tactics and resources that may adapt dynamically to the needs of each individual learner without weakening academic rigor or dividing the learning community.

Artificial Intelligence in Education: An Overview

The use of computational systems that can carry out tasks often associated with human cognition, such as natural language processing, pattern recognition, predictive modeling and adaptive decision-making, is referred to as artificial intelligence in education (Luckin et al., 2016). The ability of AI systems to learn from data, react instantly to student input and customise educational experiences at scale sets them apart from previous generations of educational technology. AI applications in literature education include a broad range of tools, including intelligent comprehension-guiding tutoring systems, automated text simplification and summarization tools, sentiment and thematic analysis systems, text-to-speech and speech recognition technologies and learning analytics platforms that monitor engagement and advancement. These tools hold particular promise for inclusive literature instruction because they can mediate the interaction between learner and text in ways that are responsive rather than prescriptive.

Adaptive questioning systems, for example, can scaffold interpretation by modifying the complexity of prompts based on student responses, while AI-driven annotation tools can precisely provide contextual explanations of figurative language or historical references when a learner is having trouble. Constructivist and sociocultural theories of learning, which place an emphasis on scaffolding, feedback and the gradual transfer of responsibility from support systems to learners, are strongly aligned with such responsiveness (Vygotsky, 1978). According to Holmes, Bialik, and Fadel (2019), AI's ability to personalise, that is, to adjust content, pacing, feedback and assistance to each learner's requirements, preferences, and developmental trajectories, is its most important educational contribution. Personalization is a pedagogical requirement rather than a luxury for kids with learning challenges. Instead of requiring adherence to universal instructional norms, personalized AI systems can accommodate variations in processing speed, attention span and preferred forms of engagement, enabling learners to interact with literary texts in ways that match with their cognitive profiles. When thoughtfully integrated into inclusive pedagogical frameworks, AI, thus, has the potential to shift literature education from a model of standardization to one of responsive, learner-centered design, ensuring that access to literary meaning and critical engagement is genuinely equitable.

There are some AI-supported strategies for inclusive literature classrooms. They include Multimodal Text Representation**.** The ability of artificial intelligence to change the representation and accessibility of literary texts is one of its most important contributions to inclusive literature courses. Text-to-speech (TTS) technology is one of the most extensively studied and useful AI-supported tools. According to empirical research, TTS systems greatly improve reading comprehension for students with reading disabilities by reducing the cognitive load

of word recognition and decoding, allowing students to concentrate on meaning construction and interpretation (Moxley, Tighe, & Wagner, 2018). This decrease in decoding load is especially significant in literature schools, where texts frequently contain complex grammar, figurative language, and foreign terminology.

Modern AI-powered TTS systems do more than just render text orally. They enable students to customize the reading experience to their own requirements and preferences by synchronising spoken narration with dynamic text highlighting, offering numerous voice selections and adjusting reading speed and intonation. In line with cognitive theories of multimedia learning and Universal Design for Learning (UDL) principles, which stress offering multiple means of representation to accommodate learner variability, this multimodal engagement simultaneously activates auditory and visual processing channels (Meyer, Rose, & Gordon, 2014). These characteristics can distinguish between passive text exposure and active, meaningful engagement with literary content for students with dyslexia or language processing issues.

AI-based text simplification and paraphrasing techniques, in addition to TTS, are essential for improving access to difficult literary classics. While maintaining the main ideas and narrative meaning of the original text, these algorithms can produce different versions of passages by streamlining sentence structure, making sense of archaic or figurative language and offering embedded explanations (Alonzo, Basaraba, & Tindal, 2020). When applied carefully, these resources serve as scaffolding that give students the confidence to tackle canonical literature rather than taking the place of the actual literary work. By switching between the original and simplified versions, learners can progressively acquire the linguistic and interpretive abilities needed to interact with more complicated language on their own.

Adaptive Learning is another AI-supported strategy for inclusive literature classrooms. AI technologies provide strong mechanisms for increasing learner engagement through adaptive learning systems, in addition to improving access. In order to dynamically modify instructional content and support, these systems continuously analyse learner interactions, including answers to comprehension questions, time spent on activities and error patterns. Differentiated comprehension questions, tailored vocabulary education, or tiered interpretative prompts that adjust to each student's comprehension level are examples of adaptive learning in literature classrooms. Dede (2014) posits that adaptive technologies preserve motivation by preserving the ideal ratio of challenge to support. This is especially crucial for kids with learning disabilities who may have repeatedly failed academically or become disengaged. For instance, pupils can be guided gradually from literal comprehension to inferential and evaluative analysis using AI-supported adaptive questioning, guaranteeing that fundamental comprehension is established before higher-order interpretation is anticipated. In addition to promoting comprehension, this

progressive scaffolding increases students' self-assurance and sense of competence. Additionally, learning analytics produced by adaptive systems can give teachers useful information about how their students read, allowing for more focused and adaptable teaching strategies.

By enabling guided, low-stakes interaction with literary texts, AI chatbots and conversational agents further increase engagement. By asking follow-up questions or providing clarifications depending on student input, these tools can encourage students to consider themes, character motives, narrative voice, and moral quandaries. Conversational AI offers a safe space where students can explore and improve their ideas without worrying about being judged right away, which is beneficial for students who might feel uneasy taking part in class discussions or who need more time to process information. These resources can increase participation, enhance interpretive discourse, and promote a more inclusive and dialogic literature classroom atmosphere when combined with teacher-led discussion.

Furthermore, formative assessment is one of the AI-supported strategies for inclusive literature classrooms**.** Through traditional written assessments, students with learning disabilities frequently find it difficult to demonstrate understanding. By enabling learners to express interpretations verbally, AI-enabled speech-to-text technologies change the emphasis from transcription skills to analytical reasoning (Graham et al., 2018). Additionally, formative assessment tools with AI support offer quick, tailored feedback on students' answers. According to research, prompt feedback improves learning outcomes and self-regulation, but it shouldn't take the place of instructor judgment (Hattie & Timperley, 2007).

The Role of the Teacher in AI-Enhanced Inclusive Classrooms

Teachers continue to play a crucial role in the realization of inclusive literary education, despite the increasing sophistication and accessibility of artificial intelligence tools. No matter how sophisticated, AI technologies lack pedagogical judgment, contextual sensitivity and ethical responsibility, all of which are essentially human abilities. Selwyn (2019) makes a strong case that AI should be viewed as a type of pedagogical augmentation, tools that increase teachers' ability to adapt to the diversity of learners while maintaining the relational and interpretive aspects of teaching, rather than as a replacement for teachers. The teacher's role as a facilitator of critical inquiry and interpretative depth is indispensable in literary classrooms where meaning is negotiated, challenged, and created via discussion.

It is the duty of educators to choose and contextualize AI tools in ways that meet the needs of students and the objectives of the curriculum. In order to encourage student independence, this involves deciding when and how to offer AI-generated scaffolding, such as summaries, leading questions, or feedback, as well as when to gradually remove such supports. Additionally, rather than letting algorithmic outputs

control pedagogical choices, educators must critically assess learning analytics and AI-generated data and use them to inform instruction. Teachers are essential in promoting critical engagement with AI itself in inclusive literature classrooms. They should encourage students to challenge automated interpretations, acknowledge their limitations, and see AI outputs as sources of inquiry rather than as authoritative readings of literary texts.

Sustained professional development is necessary to carry out these duties in an efficient manner. Teachers need to acquire AI literacy that includes pedagogical and ethical knowledge in addition to technical proficiency. In this sense, Koehler and Mishra's (2009) Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the necessity for instructors to combine technological knowledge with subject-matter expertise and excellent pedagogy, is especially illuminating. This entails comprehending how AI tools interact with literary analysis, interpretative techniques, and assessment criteria in the context of literature instruction. In order to ensure that technology supports rather than diminishes literary interpretation and critical thinking, educators can assess the impact of AI on student learning with the help of teacher-guided reflection and collaborative professional learning communities.

Ethical, Equity and Policy Considerations

AI integration in inclusive literature classes presents difficult ethical, equity and policy-related issues that need careful consideration. Data privacy, algorithmic bias, transparency and fair access are among the most important of these. Large-scale data gathering is frequently necessary for AI systems to operate efficiently, which raises concerns about the use, storage and possible abuse of private learner data. In this sense, students with learning disabilities are especially at risk because biased algorithms, incorrect profile, or misclassification could promote deficit narratives rather than inclusive learning paths (UNESCO, 2021). UNESCO (2021) emphasizes 36+9the importance of accountability and transparency in the application of AI, promoting systems that are auditable, explicable and compliant with human rights standards. As a result, educational institutions need to establish explicit guidelines for the choice, application, and assessment of AI tools. These regulations should guarantee informed permission, outline data retention and security protocols, and give students and parents precise information about how AI systems operate and what data they gather. In order to prevent AI integration from worsening already-existing educational disparities, it is equally crucial to provide alternatives for kids who do not have consistent access to digital devices or connectivity.

Ethical AI integration is a moral requirement that is strongly related to the fundamental principles of inclusive education, rather than just a technical or administrative issue. In order to ensure that technological innovation promotes human flourishing rather than efficiency alone, decisions about the employment of

AI must be informed by a dedication to fairness, dignity and learner empowerment. This ethical position is especially important in literature classes since works frequently address concerns of justice, identity and power, which should also guide the use of instructional technologies.

Implications for Practice and Policy

It takes comprehensive and coordinated activity at numerous levels of the educational system to effectively deploy AI to promote inclusive literature classrooms. In order to improve access, engagement and expression while upholding strict literary standards, educators must create learning experiences in the classroom that incorporate AI-supported tactics. To help instructors integrate AI carefully, school administrators and leaders should offer ongoing professional development, technical assistance and time for group planning. From a policy standpoint, governments and educational authorities should make investments in inclusive and accessible digital infrastructure to guarantee that all students, regardless of socioeconomic background, can profit from AI-enhanced learning. By providing financing for pilot projects, long-term studies, and independent assessments that look at both learning outcomes and ethical implications, policymakers should also encourage the use of AI that is informed by research. To control data use, algorithmic accountability and vendor practices in educational technology, clear regulatory frameworks are required.

Incorporating AI-supported techniques into literature curricula in ways that promote learning objectives, assessment standards and inclusive education objectives is a crucial responsibility of curriculum designers. This entails creating tests that prioritise critical engagement, creativity, and interpretive reasoning over mechanical correctness and making sure AI tools are positioned as learning aids rather than performance accelerators. AI can be a potent catalyst for justice, creativity and pedagogical renewal in literature education when used carefully and morally. This will allow all students, including those with learning disabilities, to interact deeply and profoundly with literary texts.

Conclusion

Literature classrooms could be transformed into truly inclusive learning spaces for students with learning disabilities thanks to artificial intelligence. AI offers effective solutions to long-standing issues with traditional literature training by facilitating flexible and authentic forms of student expression, supporting personalised learning pathways and offering multimodal access to complicated literary texts. Students can interact with literature in ways that suit their cognitive profiles without sacrificing academic rigor or interpretative depth thanks to tools like text-to-speech systems, adaptive reading platforms, intelligent tutoring agents and AI-assisted feedback mechanisms.

Importantly, AI's educational value comes from its ability to enable inclusive teaching rather than automation. AI enables many forms of representation, interaction and expression when it is based on Universal Design for Learning (UDL) principles, guaranteeing that learner diversity is anticipated rather than retroactively accommodated. This method moves literature instruction away from deficit-oriented models that prioritise remediation and toward strength-based approaches that acknowledge and develop students' capacity for analysis, creativity, and emotion. This change is revolutionary for students with learning disabilities, allowing them to engage meaningfully in literary inquiry and validating their identities as competent readers, thinkers, and interpreters.

However, the potential of AI in inclusive literature classes can only be fulfilled by careful, morally sound application. When choosing, contextualising and assessing AI solutions, educators must continue to be at the forefront of instructional decision-making. It is crucial to pay attention to ethical issues including data privacy, algorithmic bias, transparency and fair access to make sure that technology advancements do not replicate or worsen already-existing disparities. Thus, consistent professional growth, cogent policy frameworks and institutional support are essential. In the end, a shared dedication to equality, empathy and pedagogical brilliance is more important for the successful integration of AI in literature instruction than technological proficiency. AI can serve as a catalyst for reimagining literature classrooms as places where all students, including those with learning disabilities, can access, interpret and respond to literary texts with confidence, creativity and critical insight when it is in line with inclusive values and directed by reflective teaching practice.

Recommendations

In light of the pedagogical opportunities and challenges associated with the use of artificial intelligence in inclusive literature classrooms, the following recommendations are proposed for educators, institutions, policymakers and curriculum developers:

1. Educators and curriculum planners should ensure that AI tools are embedded as core instructional features rather than optional add-ons, ensuring that learner variability is anticipated and normalized within literature instruction.
2. AI tools should be selected and implemented based on clear instructional goals in literature education, such as enhancing comprehension, supporting interpretation or expanding expressive options.
3. Continuous professional development programmes on AI literacy, inclusive pedagogy, data interpretation and reflective practice should be established to equip teachers with the pedagogical, technical and ethical competencies required for effective AI integration.

4. Literature teachers should employ AI-generated feedback, summaries or interpretive prompts as formative support and these should not replace teacher judgment.
5. Educational institutions must develop clear policies addressing data privacy, informed consent, algorithmic transparency, bias mitigation and ensure equitable access to digital infrastructure and alternative learning pathways.
6. Literature assessments should be restructured to emphasize analytical reasoning, thematic understanding and creative interpretation rather than mechanical accuracy or speed.
7. Policymakers and educational leaders should support pilot studies, classroom-based research and longitudinal evaluations to examine the impact of AI on inclusive literature learning -sensitive models of AI integration that reflect local educational needs and cultural contexts.
8. Students should be encouraged to engage with AI outputs as tools for inquiry rather than authoritative voices.

By implementing these recommendations, educators and institutions can harness the transformative potential of artificial intelligence to foster inclusive, equitable, and intellectually rigorous literature classrooms that empower students with learning difficulties to participate fully and confidently in literary learning

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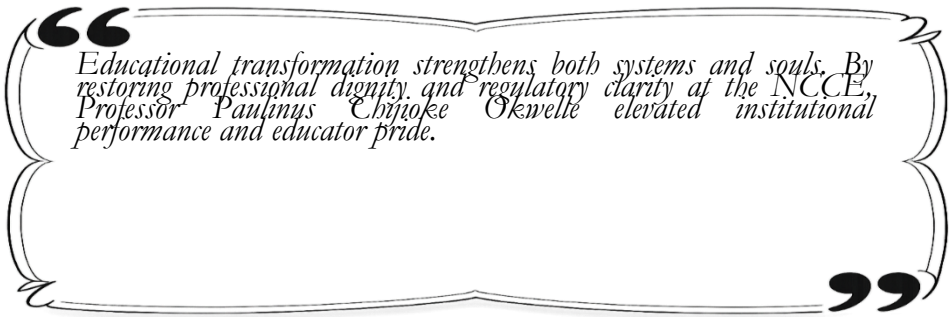
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Chapter 33

Comparative Education & Global Best Practices in Teacher Education: Advancing Quality and Innovation in Nigeria Under the Leadership of Professor Paulinus Chijioke Okwelle

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Abstract

Comparative education plays a pivotal role in enhancing teacher quality and driving educational reforms globally. In Nigeria, challenges such as teacher shortages, uneven professional development, and limited adoption of innovative pedagogical practices necessitate a critical examination of international best practices. This study examines how global models of teacher education can inform and strengthen Nigerian teacher training, with particular reference to the contributions of Professor Paulinus Chijioke Okwelle, a leading educationist and policy reformer. Utilizing a qualitative methodology, the research draws on an extensive review of literature, policy documents, and case studies from both developed and developing countries. The analysis highlights key lessons from international systems, including structured mentorship, continuous professional development, ICT integration, and evidence-based curriculum design, and explores their successful adaptation within Nigerian colleges of education. Findings indicate that the strategic application of these global practices, combined with visionary leadership exemplified by Professor Okwelle, can significantly enhance teacher professionalism, improve student learning outcomes, and strengthen educational governance. The study underscores the importance of ICT-driven teaching, robust quality assurance mechanisms, and policy alignment with global standards. Policy implications include the need for sustained investment in teacher training, institutionalized mentorship programs, and the integration of comparative education insights into national curriculum frameworks.

Keywords: *Comparative education, Teacher education, Global best practices, ICT integration, Educational leadership*

1.0 Introduction

Comparative education is an academic discipline concerned with the systematic study of educational systems, policies, and practices across countries, with the goal of identifying insights that can inform improvements within specific national contexts (Bray, Adamson, & Mason, 2014). Globally, the field has evolved over centuries, emerging in the nineteenth century as scholars sought to understand the educational innovations of other nations and assess their applicability domestically (Phillips & Schweisfurth, 2014). Initially, comparative education focused primarily on descriptive and historical analyses, but contemporary approaches emphasize analytical, policy-oriented, and interdisciplinary perspectives that consider cultural, socio-economic, and technological dimensions (Carnoy & Rhoten, 2002). In the Nigerian context, comparative education has become increasingly relevant as policymakers and educators grapple with systemic challenges, including disparities in access, teacher quality deficiencies, and the need to align national curricula with global standards (Ojukwu, 2020). Nigerian colleges of education, which serve as the primary institutions for teacher training, have drawn lessons from international models to improve pedagogical methods, curriculum development, and professional development frameworks (Adeyemi, 2018).

The importance of comparative education is further underscored by its alignment with the United Nations Sustainable Development Goals (SDGs), particularly SDG 4, which emphasizes inclusive and equitable quality education and lifelong learning opportunities for all (United Nations, 2015). Achieving SDG 4 requires not only expanding access to education but also enhancing teacher quality, professional competency, and instructional effectiveness (UNESCO, 2016). In this regard, comparative education provides the tools to examine best practices in teacher preparation, classroom management, assessment techniques, and the integration of emerging technologies (Adu, 2019). For instance, countries such as Finland and Singapore have implemented evidence-based teacher training programs, continuous professional development, and robust mentorship systems that have yielded high student outcomes and internationally recognized teaching standards (Sahlberg, 2015; Tan, 2017). Lessons from such contexts can inform the design and reform of Nigerian teacher education policies, ensuring that graduates are adequately prepared to meet the challenges of a rapidly changing educational landscape.

Focusing on global best practices in teacher education is particularly pertinent for Nigeria, where several systemic challenges persist. Despite the expansion of teacher training institutions, the country faces significant teacher shortages, uneven distribution of qualified personnel, and low adoption of innovative pedagogical strategies (Federal Ministry of Education [FME], 2022). Studies reveal that in some regions, student-to-teacher ratios exceed 40:1, undermining effective learning (Ogunyemi & Lawal, 2021). Moreover, the integration of information and

communication technology (ICT) in teaching remains inconsistent, with infrastructural deficits and limited training hindering adoption (Obanya, 2017). These challenges have direct implications for student learning outcomes, professional development, and overall educational quality. Examining global best practices enables Nigerian institutions to adopt, adapt, and contextualize strategies that have been successful elsewhere, thereby improving both teacher competence and student achievement (Darling-Hammond, 2017).

Professor Paulinus Chijioke Okwelle has played a transformative role in advancing teacher education and policy reform in Nigeria. As the Executive Secretary of the National Commission for Colleges of Education (NCCE), Professor Okwelle has championed initiatives that enhance curriculum innovation, strengthen quality assurance, and promote ICT integration in teacher preparation (NCCE, 2021). Under his leadership, colleges of education have expanded professional development programs, established partnerships with international educational bodies, and implemented structured mentorship schemes for novice teachers (Okwelle, 2020). His advocacy for evidence-based policies and strategic reforms has also contributed to improved monitoring of teacher quality and the standardization of academic assessment practices. By situating the Nigerian teacher education system within a global comparative framework, Professor Okwelle's work demonstrates the value of drawing on international experiences to foster national educational development.

1.1 Research Problem

The research problem addressed in this study stems from persistent challenges in Nigerian teacher education, including inadequate teacher supply, uneven distribution of qualified personnel, suboptimal student learning outcomes, and limited ICT adoption in colleges (FME, 2022; Ogunyemi & Lawal, 2021). These issues are compounded by infrastructural deficits, inconsistent policy implementation, and limited professional support for educators, ultimately affecting the quality and equity of education across the country. Addressing these challenges necessitates an informed understanding of global best practices, alongside adaptive strategies that consider Nigeria's unique socio-cultural and economic context.

1.2 Aim and Objectives

The aim of this study is to examine global best practices in teacher education and explore their adaptation in Nigeria, with particular reference to the contributions of Professor Paulinus Chijioke Okwelle in advancing educational quality and professional standards.

1.3 The objectives of the study are to:

1. Analyze international models of teacher training and professional development

2. Assess the extent of adoption and adaptation of these models in Nigerian colleges of education.
3. Evaluate the impact of Professor Okwelle's initiatives on teacher quality and educational outcomes.
4. Provide policy recommendations for strengthening teacher education through evidence-based practices.

1.4 Research Questions

The study is guided by the following research questions:

1. What global best practices in teacher education can inform the Nigerian context?
2. How have Nigerian colleges of education adopted and adapted these practices?
3. What contributions has Professor Okwelle made toward enhancing teacher quality and curriculum reform?
4. What policy measures can be implemented to address current challenges in teacher education and promote sustainable educational development?

By addressing these questions, the study contributes to the scholarship on comparative education, teacher professionalism, and educational policy reform in Nigeria. It underscores the importance of evidence-based interventions, ICT integration, and strong leadership in enhancing teacher quality and achieving sustainable educational outcomes.

2.0 Literature Review

2.1 Comparative Education: Conceptual Framework

Comparative education is broadly defined as the systematic study of education systems, processes, and outcomes across different countries or regions, with the aim of identifying similarities, differences, and transferable lessons that can enhance educational reform (Bray, Adamson, & Mason, 2014). Scholars emphasize that comparative education is not merely descriptive; it employs methodological tools to analyze how social, political, cultural, and economic contexts shape educational structures and practices (Phillips & Schweisfurth, 2014). From this perspective, comparative education serves as both an academic discipline and a practical avenue for policy borrowing, adaptation, and innovation.

The scope of comparative education has expanded significantly over the past three decades. Initially grounded in descriptive accounts of foreign schooling systems, the field now incorporates comparative policy analysis, curriculum studies, teacher education research, globalization studies, and international development frameworks

(Crossley & Watson, 2009). This expansion highlights its interdisciplinary nature and the multiplicity of lenses through which educational problems can be understood.

From a sociological perspective, comparative education investigates how social structures, such as class, ethnicity, gender, and power distribution, influence access to education and learning outcomes (Arnove & Torres, 2013). Policy studies contribute insights on the political forces that drive educational reform, including governance styles, decentralization efforts, quality assurance mechanisms, and international pressures from bodies like UNESCO and the World Bank (Steiner-Khamsi, 2012). Economics, another intersecting field, brings attention to the financial implications of teacher supply, public expenditure, human capital development, and the return on investment in teacher training (Hanushek & Woessmann, 2015).

The relevance of comparative education for contemporary reform efforts is therefore profound. It enables countries, especially developing nations to systematically study global best practices, evaluate their suitability for local contexts, and design reforms based on evidence rather than assumptions (Welch, 2017). For Nigeria, where teacher shortages, low student performance, and resource constraints persist, comparative analysis provides a strategic pathway for strengthening teacher professionalism, ICT integration, curriculum innovation, and leadership capacity in teacher education institutions (Ojukwu, 2020).

2.2 Global Best Practices in Teacher Education

Countries that consistently achieve strong educational outcomes have developed coherent, long-term systems of teacher preparation, mentorship, and professional development. Finland, Singapore, South Korea, and Ghana provide useful comparative insights for Nigerian teacher education. In Finland, teacher education is grounded in rigorous academic and practical training. Teachers are required to hold a master's degree, and universities maintain close partnerships with basic schools to facilitate research-based practicums (Sahlberg, 2015). Recruitment is highly selective: only about 10% of applicants are admitted into primary teacher education programs. This selectivity underscores the societal prestige of teaching and the strong emphasis on pedagogical expertise, curriculum design, and autonomy.

Singapore's model is characterized by systematic recruitment, continuous professional development (CPD), and strong leadership pipelines. The Ministry of Education recruits teachers centrally and provides competitive remuneration, clear career pathways, and structured mentorship through the National Institute of Education (NIE) (Darling-Hammond & Rothman, 2015). Professional development is mandatory, with teachers receiving at least 100 hours of training annually. This ensures sustained competency in pedagogy, leadership, and ICT integration.

In South Korea, a culture of respect for education drives standards in teacher training. Teacher preparation programs emphasize subject mastery, classroom management, and high-quality practicum experiences (Kim, 2017). The state's heavy investment in education supports strong public trust, well-resourced schools, and a performance-driven culture that holds teachers accountable while supporting them through coaching and peer collaboration.

Ghana provides a relevant African model. The introduction of the four-year Bachelor of Education curriculum and the National Teaching Council's teacher licensing framework represent major reforms aimed at professionalizing teaching (Akyeampong, 2017). Emphasis is placed on practicum quality, competency-based training, and ongoing mentorship during the induction phase. Although challenges remain, Ghana's reforms offer transferable insights for Nigeria, particularly regarding standardized curriculum design and the institutionalization of teacher licensing.

Across these models, common best practices include selective recruitment, continuous training, mentorship, research-informed teaching methods, and strong system-wide accountability mechanisms. Nigeria's teacher education system can benefit significantly from these insights by adapting them to local realities, strengthening institutional capacity, and improving oversight mechanisms across colleges of education (NCCE, 2021).

2.3 ICT & Digital Transformation in Teacher Education

The integration of information and communication technology (ICT) has become central to modern teacher training worldwide. Digital transformation in education extends beyond the use of devices; it encompasses digital pedagogy, virtual learning environments, data-driven instruction, and administrative automation.

Globally, several models demonstrate effective ICT integration. In Estonia, teacher education incorporates digital competence frameworks that prepare teachers for blended learning, online facilitation, and technology-enhanced assessment (OECD, 2019). The country's digital-first approach has made it a leader in educational technology adoption. In the United States and the United Kingdom, teacher preparation programs increasingly embed digital literacy, multimedia pedagogy, and e-learning design into coursework (Johnson & Adams Becker, 2016). Pre-service teachers engage in virtual simulations, digital lesson planning, and learning analytics, preparing them for technologically dynamic classrooms. The benefits of ICT integration in teacher education are well documented. ICT enhances teaching effectiveness by enabling differentiated instruction, multimedia learning experiences, and collaborative learning opportunities (Tondeur et al., 2017). It also supports administrative efficiency through digital attendance systems, automated assessment tools, and cloud-based record keeping. Furthermore, ICT aligns with

global workforce demands, enabling teachers to prepare learners for technologically complex environments.

For developing countries, ICT offers opportunities to overcome resource constraints. Virtual resource centers, online continuing professional development (CPD) platforms, and digital open educational resources (OER) broaden access to quality training at reduced cost (Unwin, 2019). However, successful ICT integration requires infrastructure, training, digital literacy, and strong institutional leadership.

2.4 Challenges in Nigerian Teacher Education

Despite efforts to reform teacher education, Nigeria continues to contend with significant systemic challenges. One major challenge is the teacher shortage. National reports indicate that the country faces a deficit of over 250,000 qualified teachers, with shortages particularly acute in rural and conflict-affected states (Federal Ministry of Education, 2022). These shortages contribute to high pupil-teacher ratios, sometimes exceeding 50:1, reducing the quality of learning environments.

Professional competency gaps also present a challenge. Many teacher trainees demonstrate weaknesses in subject knowledge, pedagogical skills, and ICT literacy (Ogunyemi & Lawal, 2021). Contributing factors include outdated curricula, limited practicum opportunities, and insufficient exposure to learner-centered pedagogy. This competency gap directly affects student performance and undermines national development goals.

Rural-urban disparities compound these issues. Teachers are disproportionately concentrated in urban centers, leaving rural communities underserved. Rural schools frequently lack infrastructure, ICT facilities, and professional support systems, making it difficult to retain qualified teachers (Obanya, 2017). Nigeria also faces barriers to adopting global best practices. These include institutional resistance to change, limited funding for training and infrastructure, lack of monitoring systems, and inconsistencies between policy prescriptions and implementation (Adu, 2019). Additionally, although comparative education provides exposure to international models, adaptation efforts often fail due to contextual mismatch, inadequate political will, or insufficient stakeholder collaboration (Steiner-Khamsi, 2012). These challenges underscore the need for evidence-based reforms that draw from global best practices while remaining sensitive to Nigeria's socio-economic and cultural realities. Strengthening teacher education reform in Nigeria requires capacity development, ICT investment, policy coherence, and commitment to continuous improvement across the entire teacher education ecosystem.

3.0 Methodology

This study adopts a **qualitative, comparative, and policy-analytic research design** to investigate global best practices in teacher education and their relevance for strengthening Nigeria's education system. A qualitative orientation is appropriate because the study aims to generate interpretive insights rather than statistical generalizations, allowing for a deeper examination of ideas, policy contexts, and institutional experiences across different countries (Bray, as cited in *Comparative Education*, n.d.; Tikly, 2020). By engaging with international models, national frameworks, and the scholarly debates around teacher preparation and educational reforms, the study positions itself within the longstanding tradition of comparative education research that emphasizes contextual understanding, cross-national learning, and systemic improvement (Crossley & Watson, 2003; Bray et al., 2014).

3.1 Research Design

The comparative dimension of the research is guided by Holmes' and Noah & Eckstein's classical frameworks, which encourage the examination of similarities, differences, and interpretive meanings across education systems (Noah & Eckstein, 1969; Bray & Thomas, 1995). Through this lens, teacher-education systems in countries such as Finland, Singapore, South Korea, and Ghana are analyzed alongside Nigeria's teacher-training landscape. The study also incorporates elements of policy analysis, drawing upon educational policy frameworks to interpret the evolution of teacher-education reforms, especially the contributions of Professor Paulinus Chijioke Okwelle to quality assurance, curriculum strengthening, and professional development within the National Commission for Colleges of Education (NCCE) (NCCE, 2020; Okwelle, 2019).

3.2 Data Sources

Data for the study are derived from four primary sources:

Academic literature

Journal articles, books, and comparative education texts that provide theoretical grounding and empirical evidence on teacher-education models (Sahlberg, 2011; Darling-Hammond, 2017; Tatto, 2021).

NCCE policy documents and reports

This including teacher-education minimum standards, digital transformation strategies, and national monitoring and evaluation frameworks (NCCE, 2012; NCCE, 2020; Federal Ministry of Education, 2023).

Government policies

Such as the National Policy on Education, SDG-related national progress reports, and teacher-quality improvement strategies (FGN, 2013; UNESCO, 2022).

Interviews and informal discussions

Conducted with educators, lecturers in Colleges of Education, policymakers, and ICT experts, offering contextual perspectives on teacher shortages, competency challenges, and ICT adoption difficulties in Nigerian institutions.

These sources collectively allow the study to triangulate findings, improving credibility and providing a more holistic analysis of teacher-education trends and gaps.

3.3 Analytical Framework

Data are analyzed using a **comparative analysis and thematic synthesis approach.** First, the study identifies recurring themes in global best practices such as teacher professionalism, rigorous recruitment processes, structured mentoring, ICT integration, and continuous professional development (Darling-Hammond et al., 2020; OECD, 2019). These themes are then compared to policy and institutional realities in Nigeria to assess alignment, gaps, and adaptability. The synthesis process involves interpreting the implications of these global practices for Nigeria, particularly in relation to SDG 4 targets on teacher supply, quality, inclusiveness, and digital competence (UNESCO, 2022). Furthermore, the analytical framework highlights the policy innovations associated with Professor Okwelle's leadership, especially reforms aimed at strengthening NCCE regulations, modernizing curriculum standards, and driving ICT-enabled teacher-education processes (Okwelle, 2021; NCCE, 2020).

3.4 Limitations and Delimitations

The study is limited by its reliance on secondary data and policy documents, which may not capture real-time institutional practices or disparities in implementation. Another limitation is the uneven availability of country-specific data, particularly for African comparative cases like Ghana. The study also does not engage in large-scale quantitative assessments of teacher performance or student outcomes.

In terms of scope, the research focuses specifically on **teacher education,** excluding broader educational reforms such as financing, infrastructure, or early childhood development. Additionally, only selected global models—Finland, Singapore, South Korea, and Ghana are reviewed, primarily due to their documented relevance and accessibility of quality literature. Despite these boundaries, the methodology provides a robust framework for evaluating Nigeria's teacher-education challenges and positioning Professor Okwelle's contributions within an international context.

4.0 Analysis and Discussion

This section synthesizes insights from global models of teacher education and examines their applicability within the Nigerian context. Using comparative education as an analytical lens, it evaluates how international reforms can inform the strengthening of teacher preparation processes overseen by the National Commission for Colleges of Education (NCCE). The analysis also highlights the leadership and reform contributions of Professor Paulinus Chijioke Okwelle, situating them within broader debates on quality assurance, ICT integration, and the pursuit of Sustainable Development Goal 4 (SDG 4), which emphasizes equitable access to qualified teachers and digital competencies (UNESCO, 2022).

4.1 Lessons from Global Comparative Education

4.1.1 Competency Development and Quality Assurance in International Models

Teacher-education systems in successful jurisdictions, such as Finland, Singapore, and South Korea, reveal several converging themes: professional rigor, selective recruitment, standards-driven preparation, and sustained mentorship. Finland emphasizes research-based teacher preparation and high academic entry standards, producing teachers with strong professional autonomy and pedagogical competence (Sahlberg, 2011). Singapore's centralized system ensures coordinated recruitment, structured career pathways, and continuous professional development (Darling-Hammond et al., 2020). South Korea maintains national competency examinations and rigorous pedagogical coursework that uphold instructional quality.

African systems also offer relevant insights. Ghana's shift to standards-based teacher education demonstrates the feasibility of building competency models within resource-constrained environments (Tatto, 2021). These cases collectively highlight the essentiality of aligning teacher preparation with coherent quality assurance frameworks, an argument long emphasized in comparative education scholarship (Bray et al., 2014; Crossley & Watson, 2003).

4.1.2 ICT Adoption and Digital Literacy in Teaching

Global comparative studies show that digital literacy is now a core expectation for teacher effectiveness. In countries such as Singapore and South Korea, ICT integration is embedded into all phases of teacher education, emphasizing digital pedagogy, virtual learning, and technology-mediated assessment (OECD, 2019). Finland adopts a holistic strategy, embedding digital tools across the curriculum rather than confining them to stand-alone ICT courses.

Benefits of ICT-enabled teacher training include improved differentiation of instruction, access to diverse learning resources, and strengthened administrative

record-keeping (Darling-Hammond, 2017). Ghana's blended-learning approaches underscore that, even in developing contexts, structured ICT integration can meaningfully improve teacher preparation (Tatto, 2021). These global examples provide valuable benchmarks for Nigeria.

4.2 Adaptation to the Nigerian Context

4.2.1 Integration into NCCE Frameworks and Colleges of Education

Nigeria's teacher-education system, coordinated by the NCCE, has progressively aligned with global standards of competency, practicum quality, and curriculum modernization. The NCCE Minimum Standards (NCCE, 2012) emphasize pedagogical depth, supervised teaching practice, and competency-based assessment. However, operational challenges, such as teacher shortages, low motivation, weak quality assurance, and infrastructural limitations, continue to undermine implementation (FGN, 2013; Federal Ministry of Education, 2023).

Integration of global best practices requires a comprehensive re-engineering of several core components within the teacher-education ecosystem. This involves establishing stronger and more transparent teacher-recruitment systems that attract highly motivated and academically solid candidates into the profession, while ensuring that entry standards reflect both national priorities and international benchmarks. It also demands enhanced practicum supervision, where student-teachers receive consistent, high-quality mentorship from trained supervisors who can guide their classroom practice, assess their competencies, and provide constructive, evidence-based feedback. In addition, sustainable professional development structures must be created to guarantee that educators continue to build their pedagogical skills, digital literacy, and subject mastery throughout their careers rather than relying on ad-hoc or one-off trainings.

Broad-based ICT adoption across Colleges of Education is essential, enabling digital learning, modern pedagogical innovations, virtual collaboration, and the integration of emerging educational technologies into teacher preparation programs, thereby ensuring that Nigeria's teacher-education system aligns with global standards and responds effectively to contemporary classroom realities.

Despite the NCCE's digital transformation strategy (NCCE, 2020), disparities persist in ICT facilities, internet connectivity, and lecturer readiness. Addressing these gaps is essential for contextualizing global best practices in Nigeria.

4.2.2 Role of Professor Okwelle in Policy Formulation, Curriculum Innovation, and Teacher Training

Professor Paulinus Chijioke Okwelle has significantly shaped Nigeria's teacher-education landscape through a purposeful blend of visionary leadership, policy

innovation, and strategic institutional strengthening. Under his stewardship at the NCCE, far-reaching reforms were introduced to promote digital transformation, reinforce quality assurance mechanisms, enhance monitoring systems, and modernize teacher-education curricula in line with twenty-first-century demands (Okwelle, 2019; 2021). His tenure notably strengthened ICT integration in teacher preparation, ensuring that digital tools and platforms became central to pedagogy and instructional delivery across Colleges of Education.

He advanced accreditation systems that prioritized digital teaching competence, setting new standards that require lecturers and student-teachers alike to demonstrate proficiency in technology-enhanced learning. In addition, he championed lecturer-training programs designed to deepen institutional capacity for digital literacy, pedagogical innovation, and contemporary instructional methods. Through curriculum alignment with global pedagogical trends, he facilitated the infusion of international best practices, making Nigeria's teacher-education system more responsive, competitive, and future-oriented. These achievements mirror international reform approaches, demonstrating how strong and intentional leadership can catalyze system-wide improvement and long-term sustainability (Darling-Hammond et al., 2020). Ultimately, Okwelle's contributions strongly align with SDG 4 by broadening access to qualified, digitally skilled teachers who are equipped to drive impactful learning in an increasingly technology-driven world.

4.2.3 Impact on Teacher Professionalism and Student Outcomes

Reforms motivated by global best practices and championed by Okwelle have contributed to improvements in teacher professionalism. Enhanced standards, digital literacy training, and strengthened practicum experiences have begun influencing teacher preparedness. International research confirms that improvements in teacher professional competence lead to measurable gains in student learning outcomes and classroom engagement (Darling-Hammond, 2017; OECD, 2019).

Although Nigeria's data remain inconsistent, available reports indicate that strengthened quality assurance and increased ICT usage enhance student motivation, digital skills, and pedagogical innovation (Federal Ministry of Education, 2023). These developments signal positive impacts arising from the adaptation of global strategies.

4.3 Policy Implications

4.3.1 Recommendations for Sustainable Teacher Training Reforms

Drawing on comparative insights, several transformative reform directions become evident for strengthening Nigeria's teacher-education system. First, teacher recruitment and entry standards must be elevated by adopting selective admission practices, similar to the highly competitive models used in Finland and Singapore,

where candidates are screened not only for academic ability but also for genuine motivation and professional commitment (Sahlberg, 2011).

Second, mentorship and practicum structures require institutionalized reform through the development of well-coordinated, school-based frameworks supported by trained supervisors, clear performance expectations, and meaningful incentives that encourage experienced teachers to serve as mentors.

Third, continuous professional development (CPD) must be expanded and embedded into the career trajectory of every educator, consistent with global evidence showing that sustained, high-quality CPD is essential for maintaining strong pedagogical skills, improving instructional practice, and fostering digital fluency (Darling-Hammond et al., 2020).

Finally, quality assurance mechanisms need to be reinforced so that accreditation, monitoring, and evaluation systems, an area already revitalized by Okwelle's leadership are uniformly applied across all institutions, thereby ensuring fidelity, accountability, and measurable improvement throughout the teacher-education landscape.

4.3.2 Strategies for ICT Integration, Professional Mentorship, and Curriculum Development

To deepen ICT integration, Nigeria's teacher-education system must pursue a comprehensive strategy that focuses on strengthening digital infrastructure, deploying functional learning management systems, and ensuring access to adequate devices for teaching and learning. Alongside these structural investments, continuous ICT upskilling for teacher educators is essential so that digital competence becomes a sustained professional norm. Equally important is the embedding of digital pedagogy across all subject courses, modeled after Finland's holistic approach, where technology is seamlessly integrated into instructional design, assessment, collaboration, and classroom innovation (OECD, 2019).

For professional mentorship, the sector must institutionalize structured mentorship frameworks within Colleges of Education. These frameworks should outline responsibilities for mentors, define supervision procedures, and ensure regular feedback mechanisms that support student-teachers during practicum experiences. In addition, meaningful incentives for experienced teachers are necessary to encourage their active participation in mentoring roles, thereby enriching the preparation of novice educators with practical wisdom, reflective guidance, and consistent professional support.

For curriculum development, sustained transformation requires the design of competency-based curricula that reflect global standards while addressing national educational priorities. Such curricula must integrate 21st-century skills, principles of

inclusive education, and digital pedagogy to ensure that future teachers are adaptable, innovative, and learner-centered. Moreover, periodic curriculum reviews should be institutionalized, guided by emerging insights from comparative-education research, so programs remain current, responsive, and aligned with both evolving global trends and local classroom realities.

5.0 Conclusion

The study has examined comparative education as a lens through which global best practices in teacher education can inform and enhance the Nigerian educational system. Key findings indicate that countries such as Finland, Singapore, and South Korea have successfully aligned teacher recruitment, professional development, mentoring, and curriculum design with national educational objectives, resulting in high teacher quality and improved student outcomes (Darling-Hammond, 2017; OECD, 2020). ICT integration in teacher training has emerged as a critical enabler for teaching effectiveness, administrative efficiency, and continuous professional growth, with digital literacy now recognized as a core competency for educators worldwide (Unesco, 2021; Ertmer & Ottenbreit-Leftwich, 2013).

In the Nigerian context, adaptation of these global models through the frameworks of the National Commission for Colleges of Education (NCCE) has been a key strategy for addressing teacher shortages, competency gaps, and rural-urban disparities in educational delivery. Professor Paulinus Chijioke Okwelle's leadership has been instrumental in driving curriculum innovation, enhancing teacher professionalism, and integrating ICT into teacher training programs, thereby improving student outcomes and advancing the quality of education across Nigerian colleges of education (Okwelle, 2022; NCCE, 2024). His contributions exemplify how visionary educational leadership can bridge the gap between global best practices and local realities.

Policy implications of the study highlight the need for sustained investment in teacher professional development, mentorship programs, and ICT infrastructure within Nigerian teacher education institutions. Furthermore, aligning teacher education policies with Sustainable Development Goal 4 (SDG 4) can ensure inclusive, equitable, and high-quality education, strengthening the national capacity to meet contemporary educational challenges (United Nations, 2022). Future research should focus on longitudinal assessments of these reforms, exploring their impact on teacher retention, classroom practices, and student achievement, while policy initiatives should prioritize scalable strategies for ICT adoption and continuous curriculum enhancement.

The integration of comparative education insights into Nigerian teacher education, championed by leaders such as Professor Okwelle, offers a pathway toward

sustainable educational reform, professional excellence among teachers, and improved learning outcomes for students nationwide.

6.0 Encomia / Reflections

As a lecturer at the College of Education, Zing, I have observed with admiration the transformative leadership and scholarship of Professor Paulinus Chijioke Okwelle, particularly in the domain of teacher education in Nigeria. His tenure as Executive Secretary of the National Commission for Colleges of Education (NCCE) has been marked by strategic reforms, a commitment to quality assurance, and the promotion of global best practices that have strengthened the professional competence of educators nationwide (NCCE, 2023).

Professor Okwelle's contributions to teacher education are both systemic and visionary. He has overseen curriculum innovations that align Nigerian colleges of education with international standards, emphasizing the integration of information and communication technology (ICT) and digital literacy in pedagogical training (Darling-Hammond, 2017; UNESCO, 2020). These initiatives are particularly relevant for lecturers and teacher trainees like myself, as they provide the frameworks and tools necessary to enhance instructional quality, support student learning outcomes, and foster professional growth.

One of the hallmarks of Professor Okwelle's leadership is his emphasis on global best practices in teacher training. By advocating for policies and programs that draw lessons from countries with high-performing educational systems such as Finland, Singapore, and South Korea, he has provided a roadmap for Nigerian colleges of education to modernize pedagogical approaches while remaining contextually relevant (OECD, 2020). His guidance has enabled institutions like ours to consider effective strategies for teacher mentoring, competency development, and curriculum adaptation, all of which contribute to the overarching goal of improving the quality of education in Nigeria.

Beyond policy and curriculum reform, Professor Okwelle has significantly influenced teacher professionalism and educational leadership. His initiatives encourage lecturers to engage in continuous professional development, reflective practice, and collaborative learning. By fostering an environment that values evidence-based decision-making, ethical leadership, and accountability, he has strengthened the integrity and credibility of Nigerian teacher education institutions (Fullan, 2016). This focus on professional excellence resonates deeply with educators committed to shaping future generations of teachers and learners.

Reflecting on the broader impact of his work, it is evident that Professor Okwelle's legacy extends beyond administrative reforms. He has championed inclusive policies that address disparities in rural and urban teacher training, improved access to ICT resources, and supported programs that enhance student outcomes and

employability. These interventions demonstrate his unwavering dedication to advancing education and empowering generations of Nigerian educators and students (Adebayo, 2021).

Even without personal acquaintance, it is possible to recognize the profound influence of Professor Paulinus Chijioke Okwelle on teacher education in Nigeria. His leadership has strengthened institutional capacity, fostered global integration, and enhanced the professionalism of lecturers and teachers nationwide. As a lecturer at COE Zing, I view his work as an inspiration and a benchmark for excellence in educational leadership. Professor Okwelle's legacy will undoubtedly continue to shape teacher education policy, curriculum development, and professional practice for years to come.

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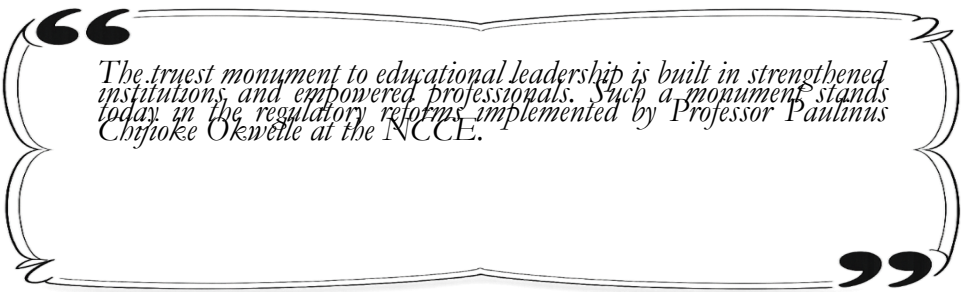
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Chapter 34

Comparative Education and Global Best Practices: The Chinese and Igbo Apprenticeship Systems

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Abstract

Apprenticeship systems constitute enduring forms of skills acquisition and socio-economic integration across cultures. Within comparative education, they are increasingly recognized as legitimate educational institutions that transmit not only technical competencies but also cultural values, work ethics, and social capital. This paper undertakes a comparative analysis of the Chinese apprenticeship system and the Igbo apprenticeship system of southeastern Nigeria (popularly known as Igba boy or Igba boi). Anchored in cultural transmission theory and situated learning theory, the study adopts a qualitative and conceptual methodology based on scholarly literature and contextual analysis. The paper examines the philosophical foundations, organizational structures, learning processes, outcomes, and contemporary transformations of both systems, situating them within global best practices in apprenticeship education. The study argues that while the Chinese system emphasizes mastery, standardization, and formal integration, the Igbo system prioritizes entrepreneurship, experiential learning, and communal wealth redistribution. A hybrid framework drawing on both models is proposed for apprenticeship reform in developing and transitional economies.

Keywords: *Comparative education; apprenticeship; vocational education; Igbo apprenticeship system; Chinese apprenticeship system*

1. Introduction

Apprenticeship remains one of the oldest and most resilient forms of education, predating formal schooling systems while continuing to play a vital role in skills development and economic productivity. In many societies, apprenticeship has served as the primary mechanism through which occupational skills, work ethics, and cultural values are transmitted across generations. In contemporary education

discourse, renewed interest in apprenticeship has emerged in response to persistent challenges such as youth unemployment, skills mismatch, and the limited effectiveness of purely academic pathways.

Comparative education offers a useful framework for examining apprenticeship systems across cultures, as it emphasizes the relationship between education, culture, and socio-economic context. Rather than viewing apprenticeship as a marginal or inferior alternative to formal schooling, comparative scholars increasingly recognize it as a legitimate educational institution embedded within specific cultural traditions. This paper contributes to this discourse by examining two culturally distinct yet economically effective apprenticeship systems: the Chinese apprenticeship system and the Igbo apprenticeship system of southeastern Nigeria.

The Chinese apprenticeship system has evolved from traditional Confucian guild-based training into a modern, semi-formalized structure integrated within national vocational education policy. By contrast, the Igbo apprenticeship system remains largely informal but has gained global recognition for its effectiveness in producing entrepreneurs and sustaining indigenous commercial networks. By comparing these two systems, the paper seeks to identify culturally grounded practices that align with global best practices in apprenticeship education.

2. Literature Review

2.1 Apprenticeship in Comparative Education

Apprenticeship is widely conceptualized in comparative education as a form of non-formal or informal learning characterized by mentorship, experiential participation, and socialization into occupational communities. Scholars argue that apprenticeship addresses gaps left by formal education by linking learning directly to productive activity and social responsibility. Within vocational education research, apprenticeship is increasingly promoted as a strategy for enhancing employability and supporting inclusive economic development.

2.2 Chinese Apprenticeship and Vocational Education Reform

Scholarship on Chinese apprenticeship highlights its historical foundations in Confucian ethics emphasizing hierarchy, discipline, and mastery, as well as its contemporary transformation through state-led vocational education reforms. Zhao and Selvaratnam (2024) identify modern apprenticeship as central to China's skills development strategy, emphasizing school–enterprise cooperation and competency-based training. Wang and Zhang (2023) further demonstrate how work-integrated learning models have strengthened alignment between vocational institutions and industrial needs. Policy frameworks such as the State Council's (2002) decision on vocational education reform institutionalize apprenticeship as a tool for workforce development. Recent studies also document the incorporation of digital technologies

into apprenticeship training, reflecting efforts to modernize skill transmission while preserving craftsmanship values.

2.3 The Igbo Apprenticeship System in Scholarly Discourse

The Igbo apprenticeship system has attracted increasing scholarly attention for its role in entrepreneurship development and wealth creation. Omede and Chukwu (2024) establish a strong relationship between apprenticeship participation and economic empowerment in southeastern Nigeria. Familoni (2024) conceptualizes the system as an informal business school that equips apprentices with managerial competence and commercial networks. Eze (2023) situates the system within social and situated learning frameworks, emphasizing learning-by-doing and community participation. Ethical concerns regarding exploitation and lack of regulation are raised by Afunugo and Molokwu (2024), who call for policy safeguards to ensure sustainability.

2.4 Research Gap

Despite growing literature on both systems, few studies adopt a comparative education approach that examines formalized state-led apprenticeship and indigenous informal systems side by side. This paper addresses this gap by comparatively analyzing the Chinese and Igbo apprenticeship systems through cultural transmission and situated learning lenses.

3. Theoretical Framework

This study is anchored in cultural transmission theory and situated learning theory. Cultural transmission theory explains how skills, values, and norms are passed across generations through participation in culturally embedded practices. Situated learning theory emphasizes learning as participation in communities of practice rather than abstract instruction. Both theories are well suited to apprenticeship systems, where learning occurs through sustained engagement with experienced practitioners.

4. Methodology

The study adopts a qualitative, conceptual, and comparative methodology. Data are drawn from secondary sources including scholarly literature, policy documents, and documented practices relating to Chinese and Igbo apprenticeship systems. Comparative education methods are employed to identify similarities, differences, and transferable lessons. The study emphasizes interpretive analysis rather than empirical measurement, allowing for culturally sensitive examination of apprenticeship as an educational institution.

5. The Chinese Apprenticeship System

The Chinese apprenticeship system historically developed within guilds and family trades, emphasizing long-term commitment, hierarchical mentorship, and moral education. Apprentices traditionally learned through observation, repetition, and gradual assumption of complex tasks. In contemporary China, apprenticeship has been integrated into formal technical and vocational education through school–industry partnerships. This modern model emphasizes standardization, certification, and alignment with labor market demands. While the system produces technically competent workers and supports national economic goals, critics note concerns regarding rigidity and limited entrepreneurial orientation.

6. The Igbo Apprenticeship System (*Igba Boyi*)

The Igbo apprenticeship system is an indigenous educational institution rooted in communalism, kinship, and trust. Apprentices learn through daily participation in trade under the guidance of a successful mentor. A defining feature of the system is the settlement phase, in which the apprentice receives start-up capital to establish an independent business. The system has contributed significantly to youth employment, entrepreneurship, and wealth redistribution. However, challenges include lack of certification, legal protection, and gender inclusivity.

7. Comparative Analysis and Global Best Practices

A comparative analysis reveals that while the Chinese system emphasizes mastery, hierarchy, and formal integration, the Igbo system prioritizes flexibility, entrepreneurship, and communal upliftment. Both systems align with global best practices such as mentorship, work-based learning, and ethical formation. A hybrid model combining structured training with post-training economic empowerment offers a promising framework for apprenticeship reform.

8. Policy Implications

The paper recommends formal recognition of indigenous apprenticeship systems within national education frameworks without undermining their cultural foundations. Introducing certification, legal safeguards, and access to finance can enhance the sustainability of the Igbo model, while China can adapt settlement-like mechanisms to encourage entrepreneurship.

9. Conclusion

The Chinese and Igbo apprenticeship systems represent culturally grounded yet globally relevant educational models. Their comparative analysis demonstrates that apprenticeship remains a viable complement to formal education. Integrating the strengths of both systems can inform inclusive and sustainable apprenticeship frameworks suited to contemporary economic challenges.

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Chapter 35

Transformation Of Indigenous Education for Integrated Development in Nigeria

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Abstract

This study examines the transformation of indigenous education in Nigeria as a vital component for fostering integrated development. Indigenous education, deeply rooted in local cultures and practices, has long been marginalized within the formal educational system, leading to alienation, cultural disintegration and inefficacy in addressing the socio-economic challenges faced by many communities. This paper aims to investigate how indigenous education can be restructured to align with contemporary development goals, thereby empowering local populations and enhancing their capacity for self-determination. Through a hermeneutic approach, this study analyzes the current state of indigenous education, identifies barriers to its transformation, and highlights the critical role of indigenous knowledge in addressing local community needs. Using a theoretical framework that integrates indigenous epistemology and constructivist learning theory, this research underscores the significance of culturally relevant pedagogy and community engagement in educational practices. These authors believe that a comprehensive transformation of indigenous education is not only feasible but necessary for achieving sustainable development outcomes in Nigeria. This study suggests targeted strategies for integrating indigenous knowledge into the mainstream educational system and emphasizes the importance of stakeholder collaboration in this process.

Keywords: *Indigenous Education, Integrated Development, Educational Reform, Community Empowerment, Sustainable Development*

Introduction

Indigenous education plays a crucial role in preserving cultural heritage and promoting holistic development within communities, especially in a diverse nation like Nigeria. The educational setting in Nigeria is a tapestry woven from various ethnic cultures, each with its unique knowledge systems, practices, and values. However, the current educational framework often overlooks these indigenous practices, leading to a disconnect between formal education and the local context. As Nigeria strives for integrated development – a multidimensional approach that includes social, economic, cultural, and environmental factors – there is an urgent need to transform indigenous education to align with these broader developmental goals. This study aims to explore how indigenous education can be reimagined to foster integrated development in Nigeria, thereby empowering communities and enhancing their capacity for self-determination and sustainability.

Indigenous education in Nigeria

The historical overview of indigenous education in Nigeria illustrates a rich tapestry of diverse cultures and traditions across its numerous ethnic groups. Before colonial rule, indigenous education served as the foundation for socialization, cultural transmission, and skill development within various communities. This holistic system of learning integrated essential knowledge, values, and practices for community life, survival, and identity. Education was primarily oral and informal, relying on storytelling, rituals, and practical experiences. Elders and community leaders acted as primary educators, imparting important life skills, crafts, agriculture, and social responsibilities through observation, imitation, initiation and participation, thereby fostering a deep connection between the African learner and their cultural heritage (Osaat & Odigie, 2023).

The arrival of European colonizers in the late19th century significantly disrupted indigenous education. The British colonial administration introduced a western-style formal education system that prioritized literacy in English Language and the teachings of Christianity, marginalizing indigenous knowledge systems, values, and languages. This shift led to the systemic devaluation of local educational methods, as many indigenous practices were deemed primitive or inferior. A dual education system emerged during this period: one that catered to the colonizers' interests and another that reflected neglected and underfunded indigenous practices. Missionary schools became prevalent, providing education primarily to a select few while enforcing Western values and norms, resulting in a significant gap between those who accessed formal education and those who remained entrenched in traditional learning systems (Osaat & Odigie, 2023; Akinwumi, 2016).

Following Nigeria's independence in1960, the nation embarked on a series of educational reforms aimed at reconciling Western education with Indigenous

knowledge. Policymakers recognized the importance of preserving cultural identity amidst globalization and rapid modernization, leading to efforts to integrate Indigenous education into the national curriculum, promote bilingual education, and revitalize local languages and traditions. However, challenges persist, as the legacy of colonial education continues to influence contemporary policies, often sidelining Indigenous knowledge in favour of Western ideals (Osaat & Odigie, 2023). Today, there is a growing movement to reclaim and reform Indigenous education in Nigeria, emphasizing its potential to contribute to sustainable development and cultural preservation. This renewed interest reflects a broader recognition of the importance of inclusive education that honours and incorporates the rich diversity of Nigeria's cultural heritage, underscoring the resilience of local knowledge systems and the ongoing quest for educational equity and cultural integrity in a rapidly changing world.

Theoretical framework

This study is grounded in indigenous epistemology, which emphasizes the importance of local knowledge systems, cultural practices, and community values in shaping educational experiences. Indigenous epistemology suggests that knowledge is dynamic, collective, and contextually driven, underpinning the idea that education ought to be rooted in the cultural realities of the learner. Additionally, this framework incorporates aspects of constructivist learning theory (CLT), which advocates for experiential learning and acknowledges the learner's active role in constructing knowledge. This combination provides insights into how indigenous education can be transformed to promote integrated development by validating indigenous knowledge, enhancing community engagement, and fostering a more holistic educational approach.This comprehensive approach guides this authors in assessing how indigenous education can be adapted to serve both local communities and broader development goals effectively.

Conceptual Clarification

Indigenous Education encompasses a learning system that is deeply rooted in the cultural practices, beliefs, and knowledge systems of Indigenous peoples. This holistic approach to education transcends formal academic instruction by integrating spiritual, social, and environmental dimensions into the learning experience. Central to Indigenous education is the emphasis on community, relationships, and the interconnectivism of all aspects of life. Traditional knowledge is often passed down through oral traditions, storytelling, and hands-on experiences, with elders serving as vital custodians of wisdom, values, and cultural practices (Osaat & Odigie, 2023; Okeke, 2020; Folorunso & Olutola, 2020). They play a crucial role in imparting this knowledge to younger generations, ensuring that cultural heritage is preserved and appreciated.

A key aspect of indigenous education is its focus on context and relevance, allowing teaching methods and content to reflect the unique realities of the learner's environment. This can include lessons centered on local ecology, traditional crafts, language, and history, all of which foster a strong sense of identity and belonging. Incorporating land-based learning – where lessons take place in natural settings – further enhances this connection to cultural heritage and the environment, enabling learners to engage deeply with their surroundings. However, Indigenous education faces significant challenges, particularly as it often exists in tension with mainstream educational systems that prioritize Western curricula and pedagogies (Folorunso & Olutola, 2020). The marginalization of indigenous knowledge has led to cultural erosion, loss of languages, and disconnection from traditional ways of life. Nevertheless, there is growing recognition of the value of indigenous education within the broader educational discourse, with ongoing efforts to harmonize indigenous pedagogies with modern frameworks. This notion recognizes that indigenous education is not only about transmitting knowledge and skills. Rather, it is also a crucial vehicle for cultural preservation, community cohesion, and holistic development, grounded in the realities and needs of the people it serves (Junaid & Ibrahim, 2021).

Integrated Development is a holistic approach to socio-economic growth that seeks to improve the quality of life for individuals and communities by simultaneously addressing multiple dimensions of development. Unlike traditional methods, which often focus on isolated sectors such as health, education, or economic growth in a fragmented manner, integrated development recognizes the interconnectivism of these areas. This approach will promote solutions that account for the collective impact of various factors on people's lives, ultimately leading to more effective and sustainable outcomes (Ofoegbu & Nnebedum, 2016). Understanding how different sectors influence one another, integrated development fosters a more comprehensive strategy that enhances overall well-being.

Integrated development emphasizes collaboration among diverse stakeholders, including government agencies, non-governmental organizations, private sector, and community members. This collaborative structure will allow for the pooling of resources, knowledge, and skills, resulting in sustainable solutions (Ofoegbu & Nnebedum, 2016). For instance, improving access to education can enhance economic opportunities, boost health outcomes, and promote social cohesion, creating a positive ripple effect throughout the community. This implies that inclusivity is a vital principle of integrated development. Inclusivity ensures that the voices and perspectives of marginalized or underrepresented groups ought to be incorporated into decision-making processes. This participation may cultivate a sense of ownership and empowerment among community members, making development initiatives more relevant and sustainable. Also, integrated development essentially prioritizes long-term sustainability by considering environmental and

societal impacts and promoting responsible resource management and resilience. The ultimate goal integrated development is to achieve comprehensive and sustainable social change that uplifts individuals, strengthens communities, and fosters individual and collective well-being for a more equitable and prosperous future.

Current challenges facing indigenous education in Nigeria

Indigenous education in Nigeria faces numerous challenges that hinder its effectiveness and relevance in today's society, rooted in historical, socio-economic, and political factors that have cofigured the educational setting overtime. One of the most significant issues is the marginalization of IKS within the formal education system. The dominance of Western educational paradigms has led to a systematic undervaluation of local cultures, languages, and practices, resulting in a curriculum that often overlooks the rich heritage and traditional wisdom of indigenous communities. For instance, recently, the federal minitry of education claimed that the use indigenous langauge was the reason for low perormance in schools therefore indigenous languages should not be used as mode of instruction. Consequently, the learner may feel disconnected from their cultural identities and perceive indigenous knowledge as inferior or irrelevant, leading to a diminished interest in their cultural roots (Eze, 2017).

Another challene is inadequate funding and resources allocated to indigenous education. Many rural and marginalized communities struggle to access quality educational facilities, trained teachers, and culturally relevant learning materials. This lack of investment perpetuates educational disparities, as learners often attend under-resourced schools that fail to provide a comprehensive and engaging learning experience. Additionally, the impact of globalization and urbanization also pose a threat to indigenous education. Too, as communities become increasingly influenced by global culture and modern lifestyles, traditional practices and languages risk erosion. Young people drawn to urban centres for better education, social and economic opportunities may abandon their cultural heritage, diminishing the role of indigenous education as a means of cultural transmission.

Political instability and conflict also present significant obstacles to indigenous education in Nigeria. In regions affected by militancy and violence, such as the Niger-Delta, northcentral and northeast due to insurgency, educational institutions often become targets, leading to school closures and disruptions in learning. This instability creates an environment where education is deprioritized, perpetuating cycles of poverty and marginalization. Besides, the lack of community involvement in educational initiatives results in a disconnect between what is taught and the actual needs and aspirations of indigenous communities. As older generations pass away and younger individuals migrate to urban areas, the opportunity for direct learning from elders diminishes, threatening the continuity of traditional practices and knowledge (Osaat & Odigie, 2023). Addressing these multifaceted challenges

requires a concerted effort to integrate indigenous knowledge into the formal education system, increase funding for community-based initiatives, and foster greater involvement of Indigenous communities in shaping their educational futures. Valuing the richness of indigenous education, Nigeria can work towards a more inclusive and equitable educational setting that recognises her diverse cultural heritage.

Indigenous Education and Integrated Development

Indigenous education is critical to integrated development, serving as a foundational pillar that can foster sustainable and holistic growth within communities. Recognising the interconnectivism of cultural, social, economic, and environmental elements, indigenous education will significantly contribute to the broader objectives of enhancing the quality of life for individuals and communities in a balanced and inclusive manner. One of its primary functions is the preservation and transmission of traditional knowledge and practices, which encompass a wealth of wisdom accrued over generations, particularly in areas like sustainable resource management and ecological conservation (Anyanwu, 2018). Incorporating this invaluable knowledge into educational programmes, communities can build resilience against contemporary challenges such as climate change and food insecurity while respecting their cultural heritage.

Also, indigenous education fosters social cohesion and a strong sense of community identity by emphasising local history, culture, and languages. This connection is particularly vital in an increasingly globalized world, where local identities may become diluted. Individuals who understand and take pride in their cultural heritage are more likely to engage actively in community development initiatives, thereby enhancing social capital and collective action. Additionally, indigenous education promotes inclusive decision-making processes by involving community members – including women, youth, and elders – in the design and implementation of educational programmes (Junaid & Ibrahim, 2021; Iroham & Igbokwe, 2015). This participatory approach may ensure that local voices are heard, fostering ownership of development initiatives and increasing the relevance of educational content. Economically, indigenous education may equip individuals with practical skills relevant to their local contexts and enhances livelihoods rooted in cultural identity, thereby reducing reliance on unsustainable external economic systems and government to provide job opportunities for everyone. Through valuing indigenous knowledge and practices within development structures, societies can pave the way for more equitable, sustainable, and culturally relevant growth.

Contributions of indigenous knowledge to community development

Indigenous knowledge basically plays a vital role in community development, offering insights and practices deeply rooted in local contexts and cultural heritage.

This body of knowledge encompasses traditional wisdom, beliefs, and practices that have been shaped by the unique ecological, social, and historical experiences of the people over generations. A significant contribution of indigenous knowledge is its focus on sustainable resource management. Communities often possess an intricate understanding of their local environments, which informs practices such as rotational farming, seasonal harvesting, and water conservation (Junaid & Ibrahim, 2021). These methods promote ecological balance and sustainability, helping communities develop agricultural and economic systems that are not only environmentally friendly but also resilient to the impacts of climate change.

Also, indigenous knowledge is crucial for preserving cultural heritage and identity, which contribute to community cohesion and resilience. Passing down traditional stories, languages, rituals, and customs, communities foster a strong sense of identity among their members. This cultural preservation may enriche the social fabric of the community, strengthens bonds among individuals, and encourages solidarity and shared purpose. A robust cultural identity is essential for effective collaboration and collective action, enabling community members to work together towards common development goals (Junaid & Ibrahim, 2021). Additionally, the integration of indigenous knowledge in community initiatives empowers local populations, giving them a sense of ownership over their development pathways. When engaged in decision-making processes, community members can leverage their skills and knowledge to address local challenges, thus building resilience and adaptability. Moreover, indigenous knowledge contributes to holistic health practices that enhance community well-being by incorporating traditional methods, such as herbal medicine and holistic wellness approaches that consider emotional and spiritual aspects. The synergy between traditional health practices and modern healthcare systems can lead to improved health outcomes and greater accessibility to culturally appropriate care (Okeke, 2020; Owolabi, 2018).

In addition, indigenous governance systems, which emphasize consensus-building and collective decision-making, provide effective mechanisms for conflict resolution and social stability. These systems can foster cooperation among community members, promoting harmony and understanding. Indigenous knowledge also guides innovative economic practices aligned with local values, including the promotion of artisanal crafts and sustainable tourism. Lastly, as climate change impacts become increasingly pressing, the adaptive practices honed by the peoples over centuries offer invaluable strategies for both mitigation and adaptation, empowering communities to develop informed strategies that enhance resilience against climate challenges.

Strategies for revitalising indigenous education

Transforming ndigenous education requires different strategies which recognises the distinct cultural contexts and diverse needs of typical communities. A crucial strategy

in this transformational process is curriculum revitalization, which involves developing culturally relevant curricula that integrate IKS, languages, and practices. In incorporating local histories, traditional ecological knowledge, and cultural narratives, educational frameworks can ensure that learners gain a meaningful understanding of their heritage. Collaborating with elders and community leaders to co-create this curriculum fosters inclusivity, reflecting the values and identity of the community (Kofi, 2019).

Equally important is the promotion of bilingual or multilingual educational methods, which are essential for preserving indigenous languages and enhancing effective learning. Teaching the learner in their native languages alongside national language (English), educational institutions can bolster cognitive development and foster cultural pride. This bilingual approach supports language preservation and improves accessibility and relatability in learning experiences. Also, actively engaging communities in the educational process is vital; involving community members in decision-making and programme design cultivates a sense of ownership and agency (Junaid & Ibrahim, 2021). This participatory approach ensures that educational initiatives align with the community's needs and aspirations, ultimately leading to greater investment and commitment.

Training and professional development for educators are critical for effectively transforming indigenous education. Educators must be equipped with the knowledge and skills to teach indigenous content sensitively and inclusively while understanding the learner's cultural background. Recruiting local teachers can significantly enhance the relevance of education, providing role models for students. Furthermore, integrating traditional knowledge and practices with contemporary education through land-based learning fosters practical skills and deepens learners' connections to their heritage. Leveraging technology can also facilitate access to resources and learning networks, although it should complement rather than replace traditional forms of education. Advocating for supportive policies is essential for sustaining transformation, ensuring that indigenous education becomes a fundamental part of the national system (Junaid & Ibrahim, 2021). Lastly, establishing effective monitoring and evaluation frameworks will help assess the impact of these educational initiatives, allowing for regular feedback to adapt to the evolving needs of Indigenous communities (Osaat & Odigie, 2023; Ofoegbu & Nnebedum, 2016).

Conclusion

The exploration of Indigenous knowledge and its contributions to community development underscores the essential role of integrating traditional wisdom into contemporary practices. Indigenous education serves as a crucial tool for preserving cultural heritage and identity while promoting sustainable resource management, holistic health practices, and economic resilience. By prioritizing community

engagement and valuing Indigenous perspectives in decision-making processes, development initiatives can become more inclusive and effective, ensuring they resonate with the communities they aim to serve. Strategies such as curriculum revitalization, bilingual education, and the incorporation of traditional knowledge not only empower Indigenous communities but also enhance social cohesion and identity. Additionally, holistic approaches to governance and conflict resolution rooted in Indigenous practices foster a sense of ownership and agency, leading to more sustainable and equitable development outcomes.

As global challenges like climate change and social inequity intensify, Indigenous knowledge is increasingly vital for crafting responses that are both ecologically sound and culturally respectful. Embracing and uplifting Indigenous knowledge systems enables societies to develop pathways that honour local contexts and empower communities, paving the way for a just and sustainable future. This imperative calls on stakeholders to support Indigenous voices and actively collaborate with Indigenous communities in designing and implementing development frameworks that reflect their aspirations. Such a collaborative approach is essential for fostering resilience, sustainability, and cultural richness in an ever-evolving world.

Implications for educational philosophy

The integration of indigenous knowledge into educational practices and community development in Nigeria will have profound implications for educational philosophy, fundamentally influecing how knowledge is understood and valued. First and foremost, it will necessitate the recognition of pluralism in knowledge systems, promoting respect for diverse epistemologies. This pluralistic approach fundamentally acknowledges indigenous knowledge as a legitimate form of understanding and fosters inclusivity in educational content, thereby enriching the learning environment. Also, it emphasizes the importance of holistic education, moving beyond Western academic paradigms. This shift advocates for a model that embraces emotional, spiritual, and physical dimensions of learning alongside cognitive skills, reflecting the comprehensive nature of the peoples' worldviews.

Moreover, community-centric learning emerges as a pivotal element in this transformative educational philosophy. Prioritising community engagement and recognising that learning transcends formal settings, this approach fosters a strong sense of belonging and identity in the learner. Participatory learning methodologies that empower learners to generate knowledge collaboratively align closely with indigenous philosophies, emphasizing learner agency and the value of individual voices and experiences. Alongside this, the integration of ethical considerations reinforces responsibilities toward the environment and cultural heritage, promoting sustainable practices that honour indigenous traditions and highlight the interdependence between individuals and their communities.

Finally, the proposed educational philosophy embraces resilience and adaptability through the acknowledgment of lifelong learning as an interconnected process. This perspective reflects the cyclical nature of indigenous knowledge, viewing education as a continuous journey influenced by community, culture, and personal experiences. Furthermore, critical reflection and dialogue are encouraged to examine historical and contemporary injustices faced by indigenous peoples, supporting the learner in becoming informed, active citizens. Finally, a commitment to social justice serves as a foundation for this educational context, advocating for the rights of Indigenous peoples and promoting their self-determination in educational policy development. Valuing indigenous knowledge and practices, educational philosophy can contribute to a more equitable and just society, enriching the educational landscape in Nigeria.

Suggestions

To effectively integrate indigenous knowledge into community development, a series of suggestions can be implemented across educational and partnership frameworks. First and foremost, educational curricula should be designed to incorporate indigenous knowledge systems, history, and perspectives, ensuring authenticity by collaborating with school educators and elders.

Building strong partnerships between educational institutions and indigenous communities is crucial, as schools must actively engage local leaders in decision-making processes, respecting their expertise and lived experiences.

Additionally, supporting bilingual education initiatives and language revitalization programmes will help preserve cultural identity while enhancing communication within these communities.

Another vital aspect of this integration is the incorporation of traditional ecological knowledge (TEK) into environmental education and natural resource management practices. This approach not only enriches educational experiences but also fosters community resilience and sustainability in managing local ecosystems.

Providing professional development opportunities for educators focused on indigenous pedagogies and cultural competency is essential, equipping them with effective strategies for teaching indigenous content.

Land-based learning initiatives that allow learners to engage with their natural environment and cultural practices can further deepen their understanding and connection to Indigenous knowledge.

Promoting research that documents indigenous knowledge should be performed in partnership with local communities, ensuring that such efforts prioritise community ownership and benefits. Advocacy for policies at local, regional, and national levels

is necessary to support the inclusion of indigenous knowledge in education and development initiatives, recognising the rights of peoples to self-determination.

Organizing capacity-building workshops will empower community members with skills in sustainable development practices, entrepreneurship, and governance, further enhancing community development efforts.

Supporting initiatives that promote indigenous arts and culture not only contributes to economic development but also fosters community engagement and cultural preservation.

Implementing inclusive monitoring and evaluation frameworks that assess the impact of indigenous knowledge integration, stakeholders can collaboratively harness the rich contributions of Indigenous knowledge to achieve meaningful community development while respecting and acknowledging Indigenous voices in the broader societal context.

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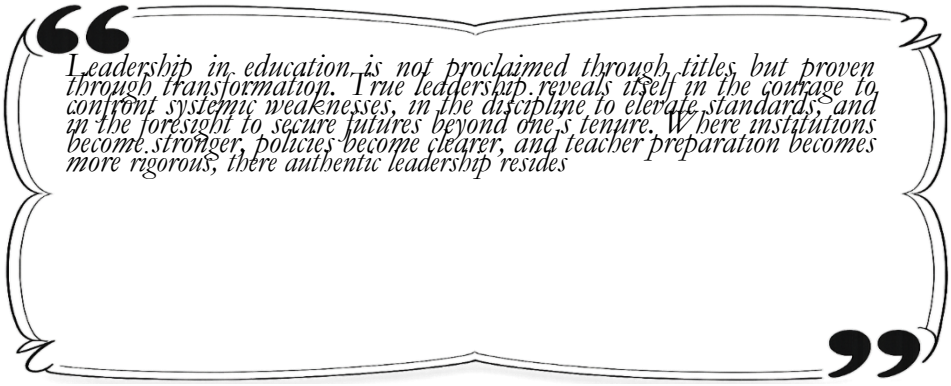
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Chapter 36

Empowering Early Childhood Educators in The Digital Age: Advancing Generations

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Abstract

As educational institutions increasingly adopt digital tools and platforms, the imperative to prepare early childhood educators for this digital transformation has become more pronounced. Despite the immense benefits of early childhood education, the aspect of empowering childhood educators has received little scholarly attention in recent times. This paper highlights the importance of equipping educators for digital teaching, emphasizing professional development in digital learning, and the possible challenges educators encounter in Nigeria. The paper deployed technological determinism and TPACK theories as the theoretical frameworks. It was found that skills development, technical and soft skills, were the areas that advancement tends to cover, with particular reference to ECE educators in the present digital age. Regarding the challenges that educators experience in the digital age, the study identifies common challenges faced by educators, such as limited internet access, resistance to technology adoption, inadequate resources, digital divide, and the government's neglect of preschools in favour of private administrations. The study concludes that as eLearning continues to evolve, the need for educators to adapt and excel in digital teaching becomes increasingly essential. It was recommended that continuous support, resources, and an environment that fosters ongoing learning, collaboration, and innovation are vital to equipping educators for digital excellence.

Keywords: *Early childhood education, digital age, educators, generational empowerment, possible challenges for educators*

Introduction

The essence of early childhood cannot be overemphasised. Its advancement is equally essential, especially in the digital age, where focus is rapidly shifting to accommodate young adults in a space that is advancing rapidly in innovation, owing to the prevalence of new media culture. In Nigeria, early childhood education and educators operate at a relatively low profile, which prevents them from receiving wider public recognition, similar to their counterparts at the primary and post-primary levels. This circumstance has directly prompted calls for attention, which should advance and revitalise the profession.

The early stages of a child's development are crucial to the buildup to adulthood. There are possibly three stages in an individual's development (Murris, 2019). These three stages include: the infancy stage, the middle stage and the adult stage. Each of these must be well reinforced for an individual to relate perfectly with his environment, others, and be productive in society. It is inevitable that, in every society, people with issues of incoherence contribute negatively to its growth and development. This herald continued efforts to ensure that the three stages are treated with purpose and vision for humanity's future.

The need for empowering educators at this level of education challenges the assumption that curricula are changing, educational policies are evolving, and teaching methods are embracing new techniques and scope, while educators may not be advancing in these areas. This development can negatively impact children's cognitive growth, which, in turn, affects their learning and maximizes their learning potential in adulthood. Essentially, educators are essential to a child's development, as children are born novices. This implies that they are to learn from scratch based on what they see, hear, feel, and imagine. Although early learning also involves parents, educators are equally trained to grow and develop the cognitive and reasoning skills of children at that age (Soyoof, Reynolds, Neumann, Scull, Tour & McLay, 2024).

The significance of early childhood education cannot be overemphasised, as these years lay the groundwork for lifelong learning and development. With the advent of technology, this field is undergoing a transformation that offers innovative approaches to teaching and learning (Labuz, 2025). Digital transformation in education involves integrating digital technologies into all aspects of the educational process, fundamentally changing the methods used by educators and the ways pupils engage with learning. It actually stands as one of the most powerful forces reshaping the educational environment today (Onasanya & Fadeyibi, 2025).

The digital age is known for speed, accuracy, precision and finesse, and all these require a high level of cognitive disposition and skills (Plowman, 2022). Without the development of good mental abilities, the likelihood of incompatible and disruptive

engagements increases. This anomaly is known to have adversely affected the growth and development of individuals and society as a whole. This reality calls for a serious reevaluation of the quality of education that people have, especially for children, in the digital age, where there is an intense need for innovation and, obviously, high expectations for tangible productivity.

Indeed, empowering the next generation is tantamount to investing in early childhood educators who train them and must have a solid foundation to grow into productive adults. The seemingly near-defocus on childhood educators in recent times may have resulted in the generation we have today, which is prone to materialism, driven by the decline of moral values and a lack of a penchant for hard work and productive living. The drive to empower early childhood educators is the fulcrum of this study.

Advancing early childhood education is equally a means of empowering generations, especially in the digital age. Without the advancement of the early childhood educator, in the present digital age, generations may have to perform below expectations (Plowman, 2022). This situation is not tolerated in an age where the quest for knowledge, innovation, and productivity relies heavily on sound cognitive and reasoning. Many scholars have argued that the present crop of Gen Z, who seem to possess some form of lackadaisical attitude, stems from epileptic early childhood education, coupled with poor upbringing, weak family structure and parental guidance. If the issue of poor early childhood education is not addressed promptly, the waning dominance of individuals who may contribute very little to society may soar, with profound detrimental implications for national development at the apex.

Extant studies have focused on the digital age as the driver of the new educational order, especially online and new media, which many countries have adopted since the COVID-19 pandemic. However, a plethora of these studies have not clearly brought into perspective the effects and challenges that digital innovations have had on Early Childhood Education (ECE) in Nigeria, specifically (Blundell, Costa Dias, Joyce & Xu, 2020).

Furthermore, increasing efforts to empower childhood educators and overhaul the childhood education system in Nigeria have inevitably attracted scholarly attention. Government policy that defocuses early childhood education from primary and post-primary education has been used as an argument for the low emphasis and underdevelopment of early childhood education in Nigeria. The argument is that the private sector handles the preschool aspect with little attention to curriculum formulation, the evaluation of existing structures, and the adjustment of tools in accordance with new teaching skills and aids (Parks & Tortorelli, 2021). However, the issues of empowering early childhood educators, which in turn can sustain generations in the digital age, seem to have received inadequate attention.

The outcome of this study will contribute to the existing literature on early childhood education and sustainability in Nigeria. The study will interest certain types of people, namely, early childhood educators, policymakers, and instructors responsible for administering preschool and primary schools.

Literature Review

This paper includes variables that require clarification of concepts, and the work is tailored accordingly. The variables include: digital age, early childhood educators, learning in the digital age, and generational empowerment. They may sound familiar, but they vary by context and thus require clarification and review to identify extant discourse and research gaps.

Digital Age

The digital revolution has permeated every facet of modern life, reshaping industries, economies, and social structures (Parks & Tortorelli, 2021). One of the most transformative sectors affected by this technological shift is education. As society moves deeper into the digital age, the educational landscape is undergoing significant changes. The traditional classroom model, which relies on face-to-face interactions and physical resources, is evolving to incorporate virtual environments, online learning platforms, and artificial intelligence (AI)-powered educational tools. It is a sequel to the rise of digital technology that has led to advancements in education.

The COVID-19 pandemic brought with it an acceptance of remote and online learning. Since the pandemic could not stop learning, it fostered it, and today reliance on e-learning has increased, introducing a new dimension to pedagogical methodology (Blundell, Costa Dias, Joyce & Xu, 2020). This is in line with the report from OECD (2025) that the COVID-19 pandemic has speed up the digital transformation of education systems around the world and demonstrated that the effective use of digital education resources does not only require technological infrastructure, but also the development of human capacity.

Furthermore, digital tools encourage learning driven by both personal and societal needs. This is a plus because each society adopts digital media to meet its prevailing education needs. Tulsiani (2024) argues that the education landscape is experiencing a significant transformation, with eLearning becoming a prevalent method of teaching. This shift requires a corresponding change in the roles and skills of educators, highlighting the need for digital training for teachers. Studies indicate that children who interact with well-designed educational technology demonstrate improved memory retention, enhanced visual processing abilities, and stronger executive functioning skills (Labuz, 2025).

Empowering Early Childhood Educators through Continuous Professional Development

Teachers are the backbone of any educational reform, and the success of any edtech initiative depends not on the tools themselves, but on how effectively educators can use them. Early childhood educators play a critical role in shaping pupils' education outcomes in increasingly digital learning environments. Empowering educators on the issue of digital competency is essential in order to secure the future of education. Unlike primary school teachers, early childhood educators differ in what they stand for and what they engage in. This explanation is very crucial because many, in different quotas, think that ECE educators are the same. The usual saying that "teacher is teacher" may not hold too much value in the case of the early childhood educator. This is not true. According to Vartiainen, Tedre & Valtonen (2020), early educators are skilled, trained professionals who nurture children's cognitive, social, emotional, and physical development. They achieve these feats through the playway method, caregiving, creating a stimulating environment that is attractive to children, and babysitting, with an understanding of specific child modelling theories and practical application.

In addition, they facilitate development through language learning and other aspects such as simple science, mathematics, and social skills. They also provide safety for children, give emotional support and boost self-respect (Orben, 2021). Professionally, they plan, implement, and evaluate experiences based on children's needs and interests. Importantly, an early childhood educator must possess certain qualities, such as patience, empathy, creativity, flexibility, passion, and a love of children. Without these qualities, they cannot cope with the rigours of the job demands. These are some of the issues that distinguish early childhood educators from other teacher cadres.

Meanwhile, emerging technologies, including generative artificial intelligence, call for renewed efforts to provide early childhood educators with attractive and effective opportunities to update their technical and pedagogical skills for digital education. One of the most significant ways to empower educators in the digital age is through continuous professional development. Rather than reproducing traditional teaching practices in a digital format, effective digital education requires teachers to carefully adapt their pedagogical approaches to new learning environments. (OECD Education Policy Perspectives, 2025).

Training ECE teachers to effectively use digital education resources is thus instrumental in building pupils' digital skills and supporting their learning in an increasingly digitalised world. The effectiveness of digital learning is directly tied to how well educators can integrate digital tools into lesson plans, use data to personalize and improve instruction, facilitate virtual and blended learning, and communicate and collaborate through online platforms (Edtech, 2025). Some

educators doubt that digital tools can improve student learning outcomes, viewing them as distractions rather than enhancements (Onyema, 2025).

The rapid pace of technological advancement means that professional development cannot be a one-time event. Continuous support and access to resources are essential for educators to stay updated with the latest trends and tools in digital education. This could include access to online tutorials, webinars, professional learning communities, and technical support. Moreso, Educators must be comfortable with various eLearning platforms, tools, and software. Training programmes should include hands-on sessions on using Learning Management Systems (LMSs), video conferencing tools, online assessment platforms, and content creation tools. These skills are crucial for educators to confidently navigate the digital teaching environment and troubleshoot common technical issues (Tulsiani, 2024).

Furthermore, fostering a culture of peer learning is another approach that facilitates professional growth. Teachers who can collaborate, share best practices, and discuss the challenges they face in the classroom are more likely to feel supported in their professional journey (Mulyadi, Muhammad & Suardi, 2025).

Learning in the Digital Age

As new tools and technologies emerge, educators must be fully skilled at learning and integrating them into their teaching. Learning in the digital age is quite different from traditional, orthodox methods. Now, technology has transformed the creation of educational content for children (Orben, 2021). Children can easily sit in one classroom and learn about forests, animals, rivers, birds, and trees without having to go into their real habitats to see them. This makes them explore and appreciate nature and artificial objects more, so that as they grow into adulthood, they become better positioned to deal with them with knowledge and wisdom.

In terms of language acquisition, videos, films, and cartoons have been used as programmes to aid language learning. Some of the cartoons are designed to make children follow the pattern of speech, diction, pronunciation and action. They learn manners, actions and reactions, which help them think critically. However, several scholars have observed that current digital learning aids often distract children and make them feel like puppets rather than develop their cognitive abilities. This assertion may have some validity as an argument. Still, it is essential to note that the digital age has significantly transformed learning processes (Berson, Luo, & Yang, 2022). As more and more countries embrace digital technology in learning, the status quo may not tilt towards the traditional learning methods that have hitherto existed. What can be done to reduce or mitigate some of the distracting elements to meet the new system's requirements? This, in itself, is innovative technology.

Considerations and Guiding Principles for Technology Use in Early Childhood Education

Arkansas State University (2022) believes that the purpose of technology integration in early childhood education should not be to integrate and use for its own sake but rather to enrich the child's experience and support intended learning and developmental outcomes. Technology should be a tool used to help achieve educational objectives.

The Department of Education's Office of Educational Technology at Arkansas State University (2022) outlines four guiding principles for using technology with early learners. Educators should ensure the following four principles when implementing technology in the classroom:

- When used appropriately, technology can be a tool for learning.
- It should be used to increase access to learning opportunities for all children.
- Technology tools may be used to strengthen relationships among parents, families, early educators, and young children.
- Learning is more effective when adults and peers interact or co-view with young children.

Integrating ICT in education: Best practices for teachers

The Encyclopedia on Early Childhood Development notes that

i. e-books and educational apps can enrich literacy learning experiences for preschool-age children. Tools that incorporate text, video, and graphics to help children grasp meanings, concepts, and stories with visuals help students note relationships between ideas. Read-along audio options can help reinforce the connection of sounds, words, and images.
ii. children can use simple, creative, educational apps to engage in active, self-directed learning by creating content (videos, audio recordings, etc.)
iii. Incorporating multimedia technologies into instructional and assessment practices can help engage students with diverse learning needs. These technologies enable flexible content delivery, allowing the differentiation of lessons and activities according to individual learning styles.
iv. Virtual classroom software and video conferencing tools allow interactive education when in-person school is not an option. These tools can also enable student interaction and collaboration with people from different communities and cultures worldwide, regardless of virtual or in-person classroom environments.

Identifying areas for advancement

There are three areas of advancement in early childhood education: skills development, industry and technical skills, and soft skills. At least in the life of an educator, these three areas are crucial. At present, several early childhood educators have advanced their skills by enrolling in postgraduate programmes in early childhood education in Nigeria. Nigerian universities offering educational courses in early childhood education are increasing, strengthening the profession and ensuring its sustainability. This can be seen as a step in the right direction because, before now, the number of universities offering postgraduate programmes in these areas was insignificant. In addition, the preschool is fast becoming a fledgling area that requires trained early childhood educators. Of late, it has been an all-comers affair. However, the rise in the number of standard preschools has created a dire need for professionals. This can be seen as an advancement of some kind. In the area of soft skills, it has been reported that many well-known early childhood educators have had to consistently improve their skills, especially in communication with children and in studying children's life patterns. This has been done in good faith as a way of accepting the profession and eagerness to add value.

Empowering Generations

Empowering generations is a key component of the Sustainable Development Goals (SDGs). It is actually directly related to education. An educated mind is already empowered. Knowledge of power and the ability to demonstrate conscious awareness of the environment and goodwill are crucial to human and social development (Berson, Luo & Yang, 2022). One essential of empowerment is digital skills. This is known to start in childhood, given that we live in the technological age. Thus, everything must begin with innovations and digital literacy. This is to guarantee future technological development because, yes, we have so much innovation now, but the scope is vastly developing, and newer models are emerging. Thus, there is a need for direct follow-up to avoid being left behind.

There is no way generations can be empowered digitally without educators. There must be a teaching mechanism put in place to guide the new generation. There is no other place to start than the early childhood level. In developed countries, preschools are known to use digital teaching aids in play classes (Martín, González & Peñalvo, 2020). They can be classified into two: namely, hardware and software. Hardware here refers to tablets, computers, and interactive whiteboards (Smartboards). These tools are physically present in the classroom and are directly used by preschool teachers. This situation is somewhat different from that in developing countries, where the high cost of procuring digital teaching tools is a constraint. The other aspect of digital teaching tools is software-driven, including interactive games (Quizlet, puzzles, etc.), interactive platforms (cartoons, animation, collaborative lessons), and video games (Ford, Kwon, K.-A., & Tsotsoros, 2021). The benefits of

digital teaching are numerous. It increases motivation among children. Naturally, games have a way of keeping children engaged. When that is deployed in the play class, enthusiasm becomes apparent, and it can bring children together in a more engaging way, which obviously boosts their morale and supports cognitive reasoning. This is good for children's self-development and confidence in integrating socially with others at an early stage.

Furthermore, digital teaching affords children the opportunity to appreciate visual and auditory composition, thereby stimulating their senses. Multimedia tools are essential because they bring together various media to teach and create more captivating opportunities for children. It also breeds creativity, especially when there is a problem to solve. Children can think of what and how to resolve conflicts. For instance, games that require arrangements of shapes to create room for passage. Another game is using balls to bring down a stack of objects (Parry & Scott, 2019). All these games and many more only lead to creativity in children. The overall benefits are in active participation. Children who are exposed to digital learning can actively participate in every aspect of the class. Through this, they gain mastery of their emotions and can easily adapt to changes.

Based on the above, it could be said that every generation begins with the growth and development of the young. Imagine that children are digitally exposed at an early age; by the time they reach primary, secondary, and tertiary education, their abilities and skills will have developed significantly, enabling them to contribute meaningfully to society. Developed countries today have leaned on these processes and made significant advances in virtually every aspect of human life. They can only create more because this system of education has become ingrained in the culture. This is what it means by empowering generations in the digital age.

Possible Challenges Educators Encounter in the Digital Age

There are several challenges for educators in Nigeria in the digital age, including unequal access to technology. Nigeria is known for epileptic power supplies and poor internet facilities. Although in many places, light seems to have stabilised, and internet facilities have improved. However, in general, many have had to rely on their mobile network's internet connectivity, which they pay exorbitantly for. It is more worrisome for low-income earners. Some early childhood educators may fall into this category, which may perpetually limit internet access, which is supposed to serve as the basis for most online training, apart from physical instruction in regular institutions. However, the study has established that meaningful advancements have occurred in early childhood education, specifically, that educators have found ways to increase self-development through postgraduate training and certification.

Another challenge is that some educators are not inclined to adopt new methodologies or tools. In a fast-changing world ruled by technology, this cannot be

acceptable. A report from research done by OECD (2025) shows that some teachers are still hesitant to use digital resources in ways that could transform the teaching and learning process, despite encouraging progress in teachers' digital competency reported by their principal.

An educator must be up to date; otherwise, they may be practicing obsolete methods, which can significantly impede children's development. Educators must understand that they need to spend time studying the shifting paradigm to understand how it works and how they can advance cognitive development in children. In this regard, content creation becomes rather imperative. A teacher must be able to understand the content and create content that suits children in a given context. Many educators in Nigeria seem to lack this aspect.

Over three decades ago, although early childhood educators were fewer in number, they were seen as dedicating time and effort to advancing children. They showed great passion to ensure that a child had a strong educational foundation before transitioning to primary school. Apart from the educators employed in preschools, families provided a semi-structured form of early childhood education, which also contributed to the high level of cognitive development. Although the level of advancement and innovation in teaching style and curriculum differ significantly from current realities, government support for preschool education seems elusive. It has been argued that preschool is administered by private individuals, which may raise curriculum issues and practical policy formulations. These are some of the key issues that appear to be slowing progress among early childhood educators in Nigeria.

Digital play is often ignored in early years' policy, yet it holds value for learning and contributes meaningfully to young children's lives in broader ways. Access to resources also remains a significant barrier to empowering educators in the digital age(Jena & Barad, 2024).

Furthermore, reports from OECD (2025) indicate that some educators are experiencing burnout and stress due to the pressure of integrating digital tools into their teaching without sufficient training or support. Numerous educators find it challenging to strike a balance between conventional teaching techniques and emerging digital approaches, especially when dealing with tight schedules, staying on top of an ever-growing list of tasks and significant workloads.

Theoretical Framework

The theoretical framework for this study draws on two key theories: Technological Determinism theory and the Technological Pedagogical Content Knowledge (TPACK) Framework

Technological Determinism Theory

The term 'technological determinism' is a branch of determinism in sociology that was coined by the American economist and sociologist Thorstein Veblen (1857-1929). In the words of Merrit Roe Smith (1994) cited by Gill Singh (2024), technological determinism can be summarized as "Technology decides history." He asserted that our lives, including those of children and youth, to a great extent, revolve around our smartphones and tablets connected 24×7 to the internet. It is so encompassing in this modern age that it is now replacing physical interaction as the preferred mode of interaction.

Proponents of technological determinism propose that technology develops in a manner that can be predicted and tracked. They believe that this happens outside of any specific influence of a culture or a society. Once the technology has been invented, the culture in which it is found begins to shape itself to accommodate the new technology.

This theory holds that technology is the primary driver of social, cultural, educational, and historical change the world is experiencing (Hauer, 2017). This implies that innovations in science and technology shape several human developments and ways of doing things. Initially, the printing press and the internet made drastic changes to the world communication system. Still, the digital age is even more engaging, and this has changed global practices across different fields.

Technological Pedagogical Content Knowledge (TPACK) Framework

The TPACK framework, developed by Punya Mishra and Matthew J. Koehler (2006), integrates technology, pedagogy, and content knowledge to enhance teachin g and learning in educational settings.

The TPACK framework highlights the interaction among three essential types of knowledge that educators require to successfully incorporate technology into their teaching practices:

1. **Content Knowledge (CK)**: This refers to the teacher's understanding of the subject matter being taught. It encompasses the concepts, theories, and prac tices within a specific discipline, allowing educators to convey complex ide as clearly and effectively.

2. **Pedagogical Knowledge (PK)**: This involves the methods and strategies of teaching. It includes knowledge of instructional practices, classroom manag ement, assessment techniques, and understanding diverse learning styles. P K helps educators design effective learning experiences that engage student s.

3. **Technological Knowledge (TK)**: This encompasses the teacher's ability to use various technological tools and resources. It includes understanding ho w to select and implement technology that enhances learning and supports p edagogical goals.

The TPACK framework describes the kind of knowledge that teachers need in order to teach with technology, and the complex ways in which these bodies of knowledge interact with one another**.**

It encourages teachers to think critically about how technology can enhance pedago gical practices and improve student learning outcomes. Therefore, it requires early educators to design lessons that incorporate technology in meaningful ways and adapt teaching strategies to leverage technological tools for diverse learning needs. By understanding the dynamic relationships among CK, PK, and TK, educators can create more engaging and effective learning environments.

Conclusion

The digital age has a plethora of technological innovations that have equally changed the way and manner in which various disciplines operate, especially education. It has driven the educational sector in such a frenzied manner that learning and cognitive reasoning have undergone drastic changes. As eLearning continues to evolve, the need for educators to adapt and excel in digital teaching becomes increasingly essential. The study highlighted some possible challenges that early childhood educators face in Nigeria, such as limited internet access, the adoption of new teaching methodologies signalled by emerging technological innovations, and the government's neglect of preschools in favour of private administrations. Continuous support, resources, and an environment that fosters ongoing learning, collaboration, and innovation are vital to equipping educators for digital excellence.

Recommendations

1. Government must strengthen educational infrastructure through investments in reliable electricity, internet services, and digital devices, especially in rural communities, to create a conducive environment for technology integration (Okebukola, 2007, cited by Onasanya & Fadeyibi, 2025).
2. Professional development programmes should focus on strategies for fostering interaction and participation in the virtual classroom. This includes multimedia resources, interactive assignments, discussion forums, and virtual collaboration tools.
3. Encouraging educators to share their experiences, challenges, and best practices which can lead to a more enriched learning environment. Peer-led workshops, teaching circles, and mentorship programmes can provide valuable platforms for shared learning and growth.

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Chapter 37

Technical And Vocational Education (TVET) In the Digital Era: Opportunities and Emerging Challenges in The Nigerian Education System

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Abstract

Digital technologies are developing fast, and they are transforming the character of employment, aptitudes, and educational provisions over the planet. Technical and Vocational Education and Training (TVET) as an important tool of workforce development is increasingly being called to bear the challenges of digital economy. In Nigeria, though, there is a skewed and systemic barrier in the implementation of digital technologies into TVET. This is a conceptual, non-empiric paper which explores opportunities and new challenges involved with TVET in the digital age of the Nigerian education system. The paper is based on the national policy documents, international frameworks, and scholarly literature to examine how digitalisation can improve accessibility, quality, relevance, and inclusivity of TVET and also challenges the infrastructural, institutional and governance barriers to effective implementation. In the paper, it is argued that in the absence of a conscious policy alignment, long-term investment, capacity building of instructors, and robust industry relations, digital TVET reforms are likely to increase existing disparities instead of introducing inclusivity in skills acquisition. The paper ends with policy and practice recommendations on how to enhance the TVET system in Nigeria regarding digital transformation.

Keywords: *Technical and Vocational Education and Training, digitalisation, skills development, the Nigerian education system, employability, Industry*

Introduction

The fourth industrial revolution involving digital technologies has changed economies and labour markets worldwide through automation, artificial intelligence,

digital platforms, and Internet of Things. These developments have increased the pressure on digitally enabled, flexible, and lifelong skills, which has reinforced the pressure on education and training systems capable of responding fast to current demands of the workforce (World Economic Forum [WEF], 2020). Technical and Vocational Education and Training (TVET) has thus taken strategic significance as a tool of equipping individuals with productive jobs, entrepreneurship and viable lifestyle. TVET in Nigeria is likely to be instrumental in helping to solve the issue of unemployment among Nigerian youth, skills mismatch, and the inability to diversify the economy. This expectation notwithstanding, the TVET sector in the past has been associated with structural issues, such as insufficient funding, ineffective infrastructure, limited industry participation, and poor perception of the sector by the society, which favors academic education over vocational careers (Okoye & Arimonu, 2016). These weaknesses have been aggravated by the rapid digitalisation of work, and at the same time, they have provided an opportunity to reinvigorate the delivery of TVET and outcomes.

The digitization skills have become key in the socio-economic transformation of Nigeria as noted in the recent national development strategies. Human capital development and digital skills are specifically identified as the cornerstones of the National Digital Economy Policy and Strategy (20201030) (Federal Ministry of Communications and Digital Economy [FMCDE], 2020). Nevertheless, these policy aspirations have not been translated into tangible reforms in the TVET subsector equally. The present paper is thus an exploration of TVET in the digital era by discussing the opportunities and the emerging challenges of the Nigerian education system with a perspective of seeking policy-relevant avenues towards empowering digital TVET.

Theoretical and Conceptual Approaches to Digital TVET

Digital age TVET is not about the introduction of information and communication technology in the teaching process. It entails the methodical incorporation of online technologies in curriculum development, pedagogy, evaluation, administration and industry partnership (UNESCO, 2016). Digital TVET puts particular emphasis on the development of occupation-related technical skills and general digital skills, such as digital literacy, problem-solving, collaboration, and adaptability.

The Human Capital Theory is a background rationale in investing in digital TVET, where it is argued that education and skills development lead to an increase in productivity and economic growth (Becker, 1993). In this view, digital competencies gained in the course of TVET make individuals more employable and competitive at the national level. In a congruent opinion, Skills Ecosystem Framework emphasizes the mutual reliance between education providers, employers, policy institutions, and labour markets in the determination of skills outcomes (Finegold, 1999). Digital TVET reforms can thus hardly be effective without bigger institutional and economic

settings. The Technology Acceptance Model (TAM) provides an understanding of the interaction between instructors and learners on the level of technology adoption. The TAM has it that perceptions of usefulness and ease of use are very influential when it comes to the acceptance of new technologies (Davis, 1989). This framework is especially applicable to the Nigerian TVET institutions where the instructor confidence and insufficient support systems restrict the adoption of digital innovations.

TVET and Digitalisation in Nigeria: The Present reality

The TVET system in Nigeria is situated on a complicated institutional and socio-economic landscape affected by a high rate of population growth, high youth unemployment, regional disparities and a growing informal economy. The provision of TVET extends across technical colleges, poly-techniques, mono colleges, colleges of education (technical) and a huge informal apprenticeship system through which most skilled workers are trained and especially in the construction, automobile, electrical installation and manufacturing trades. Federal and state ministries and specialized agencies have been sharing the oversight and control role with each other; most prominent is the National Board for Technical Education (NBTE) which has led to fragmented control and implementation of reforms to different states.

The recent national policy frameworks are focusing more on digitalization and skills development as the forces behind economic transformation. The National Digital Economy Policy and Strategy (20202030) outlines the development of human capital, digital literacy, and emerging technologies as pillars that can be used to national development (Federal Ministry of Communications and Digital Economy [FMCDE], 2020). Simultaneously, NBTE has launched programs on competency-based education and training (CBET) and Open, Digital, Flexible and e-Learning (ODFeL), indicating a move by institutions to greater flexibility and technology-facilitated TVET.

Irrespective of these policy indicators, the frustrations in most of the institutions of TVET in Nigeria depict structural constraints that have been lingering. There is still limited access to quality electricity and access to broadband connectivity especially in the rural and semi-urban regions. Most workshops usually contain old machinery which is not up to date with the current industry standards and hence, learners are not given a chance to learn digitally mediated occupational skills. Moreover, TVET funding is often too little and inconsistent, which limits investing in new equipment, online solutions, and retraining of instructors (Ayonmike et al., 2015).

The peculiarity of the situation in Nigeria is the prevalence of the informal apprenticeship system that is mostly outside the regulatory frames. On the one hand, informal apprenticeships provide more intensive skills and high relevance to the labour market, but on the other hand, they usually do not have a formal curriculum,

certification, and access to digital technologies. The opportunity to include digital tools, simple digital literacy and certification opportunities in informal apprenticeships is a challenge and an opportunity to spread the reach and viability of digital TVET reforms. In Summary, Nigeria's TVET digitalization landscape is characterized by policy ambition alongside implementation gaps. Bridging this divide requires context-sensitive strategies that acknowledge institutional capacity differences, regional disparities, and the central role of the informal sector in skills development

Opportunities of Digitalization for TVET in Nigeria

Expanded Access Across Diverse Nigerian Contexts: Digital technologies offer significant potential to expand access to TVET across Nigeria's diverse geographical and socio-economic contexts. Online and blended learning models can complement face-to-face workshop instruction, enabling institutions to reach learners in rural areas, conflict-affected regions, and underserved communities. Mobile learning platforms are particularly relevant in Nigeria, where mobile phone penetration is relatively high even in low-income settings (UNESCO, 2020).

Improved Quality and Industry Relevance of Training*:* Digitalization enables Nigerian TVET institutions to update training delivery through virtual laboratories, computer-aided design and manufacturing tools, and simulation software. These tools can partially compensate for shortages of modern physical equipment and expose learners to contemporary industry practices, particularly in electrical, electronic, ICT, and manufacturing-related trades. When aligned with NBTE's competency-based frameworks, digital tools can strengthen outcome-oriented training and assessment.

Strengthening School–Industry Linkages: Digital platforms create new opportunities for collaboration between TVET institutions and industry, including virtual apprenticeships, remote mentoring, and joint curriculum development. In the Nigerian context, such collaboration is essential for addressing long-standing skills mismatch concerns and improving graduate employability (International Labour Organization [ILO], 2018). Digital labour market information systems can also help institutions respond more rapidly to changing skills demand.

Instructor Professional Development and Peer Learning: Digital technologies support continuous professional development for TVET instructors through online courses, webinars, and communities of practice. This is particularly important in Nigeria, where access to in-person training is often constrained by funding and geographical barriers. Structured digital upskilling programmes can enhance instructors' confidence and willingness to adopt innovative pedagogical approaches.

Digital Entrepreneurship and Informal Sector Upgrading: Digital TVET offers pathways for upgrading skills in Nigeria's large informal sector by introducing basic digital literacy, digital marketing, e-commerce, and mobile-based business management tools. These competencies can enhance productivity, income generation, and the sustainability of micro and small enterprises, thereby aligning TVET with broader economic inclusion goals.

Emerging Challenges of Digital TVET in Nigeria

Despite its promise, digitalization presents significant challenges within the Nigerian TVET system. Infrastructure deficits remain the most immediate constraint. Unreliable electricity supply, limited broadband connectivity, and high data costs restrict the effective use of digital learning platforms, particularly outside major urban centers. These challenges disproportionately affect state-owned technical colleges and institutions serving low-income learners.

Instructor readiness is another critical challenge. Many TVET instructors lack formal training in digital pedagogy and have limited exposure to industry-standard digital tools. According to the Technology Acceptance Model, low perceived usefulness and ease of use reduce the likelihood of technology adoption, a pattern evident in many Nigerian TVET institutions (Davis, 1989).

Curriculum rigidity further constrains digital transformation. Approval processes for curriculum revision are often lengthy, limiting responsiveness to rapid technological change. As a result, training content may lag behind current workplace practices, undermining graduate employability. This challenge is compounded by weak institutional linkages with industry and limited use of labour market information in curriculum planning.

Digital inequality is a persistent concern. Learners from rural areas, low-income households, and marginalized groups may lack access to devices, connectivity, or supportive learning environments. Without targeted interventions, digital TVET reforms risk deepening existing socio-economic and gender disparities within the Nigerian education system.

Finally, governance and coordination challenges continue to undermine reform efforts. Overlapping institutional mandates, fragmented funding mechanisms, and limited monitoring and evaluation capacity weaken policy implementation and accountability. Addressing these systemic issues is essential for sustaining digital TVET initiatives at scale.

Policy and Practical Implications for Strengthening Digital TVET in Nigeria

For digitalization to contribute meaningfully to TVET reform in Nigeria, policy actions must be deliberate, coordinated, and equity-focused. First, national digital

economy strategies should be explicitly aligned with TVET policies and translated into costed, time-bound implementation plans with clear performance indicators (FMCDE, 2020).

Second, government investment in digital infrastructure should adopt a phased and needs-based approach, prioritizing institutions that serve disadvantaged populations and teacher training centers capable of cascading skills. Public–private partnerships can help mobilize resources and ensure sustainability (World Bank, 2025).

Third, systematic instructor capacity building is essential. Competency-based digital pedagogy programmes, supported by incentives and career progression pathways, should be institutionalized across TVET systems. Fourth, curriculum reform should emphasize modular, competency-based structures co-designed with industry to enable rapid updating and recognition of micro-credentials.

Fifth, equity considerations must be central to digital TVET policy. Targeted support for rural institutions, female participation, and low-income learners is necessary to prevent digital exclusion. Finally, a national governance and monitoring mechanism involving education, digital economy, and labour stakeholders should oversee implementation, track outcomes, and ensure accountability.

Conclusion

TVET in the digital era presents both transformative opportunities and significant challenges for the Nigerian education system. Digital technologies can enhance access, quality, relevance, and inclusivity of skills development, but only if supported by coherent policies, adequate resources, and institutional capacity. This paper underscores the need for integrated and equity-driven digital TVET reforms that align national digital strategies with skills development objectives. By addressing infrastructural, pedagogical, and governance constraints, Nigeria can reposition TVET as a key driver of employability, innovation, and sustainable development in the digital economy.

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Chapter 38

Application Of Algodoo Software in Teaching and Learning of Physics Concepts in Nigerian Secondary Schools

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Abstract

Physics deal with physical phenomena that are abstract and complex in nature which require demonstration, simulation, and modelling for student's comprehension. This can be achieved through utilization of educational software such as Algodoo, geogebra and tracker in physics teaching. Algodoo software is used to create model of objects, simulates objects and control environment like the presence of acceleration due to gravity, and air resistance and demonstrate physics phenomena in the absent of laboratory for understanding physics concepts. Therefore this paper will discuss on the features of Algodoo software that make it useful in physics teaching, explore ways of using Algodoo software in physics teaching and explore strategies and activities for teachers and students to consider when interacting with Algodoo software. The paper recommended that Physics teachers and students should be train on the use of Algodoo software and familiarize themselves with it to explore and understand it features in teaching and learning physics concepts. Students of physics should be encouraged and allow to use Algodoo frequently and practice problem that will demonstrate the use of Algodoo in physics. Physics teachers should provide opportunity to the students to developed appropriate activities at various stages when using Algodoo for teaching physics for better understanding of physics concepts.

Keywords: *Physics, Algodoo software, Teaching and Learning*

Introduction

Physics as a science subject touch almost area of science endeavour. It helps us to understand the nature of physical universe, the laws and theory that explain the

behaviour of physical bodies, the interaction between matter and the energy. Through the knowledge of physics we can be able to study and understand how things behave the way they do.

It played great role for the technological and scientific development of a nation. We can be able to understand the behaviour of physical phenomena through the application of physics making use formulas and equations in mathematics. Theories of physics are very useful in understanding is difference aspect of physics such as electronics, thermal energy, mechanics, modern physics and can be used in computation. Teaching of the concepts of this subject includes more than writing formulas on a chalkboard. There is need to create enabling environment for teaching physics effectively. Teaching is an activity that involves careful planning and arrangement from part of the teacher. It is a systematic process of impacting knowledge from the teacher or any knowledgeable person to the students. Teaching of physics consists of developing a learning environment in which students can explore and understand how the matter and energy operate and relate complex science principles to their everyday live. In order to achieve this, successful integration of ICT in teaching physics is necessary.

ICT is a general phenomenon that incorporates all of forms hardware and software including the network to facilitate communication (Livingstone, 2010). Successful integration of technology in teaching process makes the situation more collaborative that engages and motivate student learning. ICT in teaching physics help to decrease the complexity of understanding physics concept and enable student to visualized physics phenomena through modelling and simulation. Despite the huge benefit of physics for scientific and technological development there is low level application of the principle, theories and low of physics that are needed for the industrial and economic development in Nigeria. This may result from that physics is an abstract concept that require visualization, modelling and simulation of it principle and theories for better understanding. Nowadays, Some secondary schools have laboratory without available physics apparatus and some schools does not have it, this is a challenging situation. We have also witnessed a situation in which educational institution around the world have been shut down as a result of the corona virus pandemic in which Nigeria is included and the current insecurity in some part of Nigeria like the north ease and the north west zone which as a result, many schools have been shut down. This is another challenging situation in the education sector. Students are at home, science teachers have no direct access to laboratory apparatus for practical activities even if virtual or online classes are schedule. Looking at this condition, this make it possible to incorporate educational software such as Algodoo, geogebra, tracker and their kind in teaching physics and other science subject to visualized concepts, modelled object and simulation on the objects without going to the laboratory. Algodoo software is software developed by Emil Ernerfeldt in 2008. He is a student at Umea University, in Sweden. He

innovated the software as a thesis to his postgraduate master's degree in computer science for teaching physics concepts. It is use for simulation, modelling, construction of object and many activities, plotting graph as the simulation is running and many more activities for the understanding of physics.

The construction of the software was in line with constructivism perspectives that permit the construction of mathematical and scientific cognition which provide opportunity to interact with object and carryout simulations based on classical physics and geometrical optics (Gregorcic and Bodin,2017). The software was initially called phun and it was first made available in 2008. Within a short period of time, many people recognized it advantages in playing with object, demonstration of concepts and provide opportunity for playing game (Keres, 2012). Some features were added to the phun which now called Algodoo. The features added include velocity, force, playing with object to predict behaviour, plotting chart including differences strategies for distributing and arrangement of someone constructed object and activities (Gregorcic and Bodin, 2017). The added properties improved its attractiveness in physics instruction and related subjects. Even though the software is more related to physics, we can use it to create many objects and simulation in difference area of study.

Objectives of the study

The main objective of the paper is to explain Algodoo software for teaching physics. The specific objectives of the paper are to

1. Describe the features of Algodoo software use in teaching physics
2. Explore ways of using Algodoo software in physics teaching.
3. Explore strategies for teaching physics using Algodoo software.

Research Questions

1. What are the features of Algodoo software that make it useful in teaching physics?
2. What are the ways for using Algodoo software in teaching physics?
3. What are the strategies to be considered when using the software for teaching physics?

Features of Algodoo Software

Algodoo software possessed differences features located at the boundary or its edge and the centre is where object can be created and simulated. Algodoo software allows simulation of scenes to be created using simple drawing tools such as box, circle, gear, rope, chain and by changing different parameters such as density, mass, colour, size, velocity, gravity, friction and refractive index (Kirmizguul,2021).

Algodoo software has the following features

1. **Top Menu**: This section can be used to change language, toggle full screen, open option, hide windows, run tutorials and many more.
2. **Browser**: provide opportunity for browsing and saving object, locate and distribute user created environment online.
3. **Tool Option:** provide Option for selected tool.
4. **Properties Menu**. This bar contain three important element:
   a. Material: use to select materials such as glass, rubber, wood e.tc and adjust their density, refractive index and many more activities.
   b. Appearance: This is use to select the appearance of object in terms of their colour and perform many activities as you wish.
   c. Visualization: This give you the opportunity to select what properties of object you want to view during simulation such velocity, force, momentum, angular momentum, kinetic energy, potential energy and many physics concept.
5. **Tool Bar:** Contain many tools for drawing, editing and interact with your scenes
6. **Environment:** This control the environment in which Algodoo can be operated. It take care of the visibility or not of gravity, air friction and general format of viewing
7. **Simulation** : This section control the simulation of object such as playing simulation, pause, undo and redo

Ways of Using Algodoo for Teaching and Learning of Physics Concepts

1. Visualization

The software allowed for visualization of object created along with difference physical quantities acting on it as well as numerical value assign to it. This will help teacher to provide clear explanation on the model developed and students can vividly understand the concept.

2. Problem solving

In Algodoo teachers and students can create a prototype or model and run the simulation on it. Using this, teachers can demonstrate the model of abstract concept to the students for better understanding of problems. Teachers can display a velocity time graph, demonstrate simple pendulum experiment, conservation of energy while the simulation is running and it can be pulse.

3. Investigating phenomena and process

Algodoo with it interactivity and flexibility allow for the investigation of phenomena and new dimension of some aspect of physics in which

conducting experiment is a difficult things investigating about physical universe beyond the atmosphere.

When the software is used in conjunction with other technology facilities such as interactive white board provide a visible learning situation in teaching and learning of physics where learners can interact and engage with learning materials (Gregorcic, et al 2018). It can be used in some situation where actual student's involvement with learning materials is very difficult. Example of such situation is that when we want to study the kepplers law of planetary motion and other phenomenon in physics. It is more comfortable to project planet in to orbit on interactive white board than making of use of computer mouse (Gregorcic and Bodin, 2017).

4. Students Project Work

Algodoo is free software that can be downloaded over different flat form and allows for saving and transfer of file across computer and other flat form, for that reason Algodoo can be use used outside classroom for other activities. Student can use it during their project to construct a model when needed. In Sweden there is a competition for lower secondary school students called ''Swedish national competition in technology and physics'' this competition involved student for a long time up to a number of month in which students are expected to create object like vehicle using Algodoo software that can be simulated on a surface with obstacles along it (Gregorcic and Bodin, 2017) Student can use their knowledge to construct different materials as a project this will also improve their modelling skills.

5. Computer Modelling in Physics

Algodoo provide users the opportunity to manipulate difference object and parameters in physics without applying explicit mathematical and programming architecture or language. We can use it to create a simple pendulum bob and other apparatus for the conducting simple pendulum experiment. As we create the model and then simulate it to allow the oscillation of the bod as it is in the laboratory. The reading from the set up can be obtain and carryout the necessary calculation. It also provide opportunity for modelling and simulation of sources of light with glass prism to observe reflection, refraction and the influence of refractive index of difference materials in relation to reflection and refraction of light. The software provide a lot of modelling opportunity in physics for student to practice and use it to understand physics concepts.

6. Science Centre

Algodoo software has many features which provide investigative environment even outside the classroom. It can be employed in a place such as science centre to encourage both teachers and student to investigate problem and developed it model for visualization. The software provide visual environment for exhibiting physics concepts. In a situation where laboratory materials are not available or very scares we can use Algodoo software to create object even outside the laboratory. The software enables teachers and students to explore difference phenomenon in physics. Students can work in groups among themselves and interact with it to view and understand physics concepts on their own. Students can use it to explore difference concept, draw and simulate model on their own in a groups to improve their understanding in physics. The software can provide enabling environment for demonstration and creating scientific objects.

Teaching Physics with Algodoo Software

According to Eualer et al (2020) there are three steps to be consider when teaching physics with Algodoo software and each step has difference activities to perform.

These are

1. Exploration of the software fundamentals Step

In this steps student investigate the tools and function of Algodoo, they are trying to familiarizing themselves with Algodoo software by exploring some features such as drop down menu, bottoms, tools bar in order to understand the basic of Algodoo software. In this steps students are allow to interact with the software to explore various features associated with it especially when the student new to it. There are difference feature and terminology related to physics such as gravity, air friction, velocity, kinetic energy and many terms associated physics. Students may find it difficult or less to explore the various features and terminology and how to work with them but adequate knowledge of physics concept will result in student better understanding of the features and terminologies in physics in build in the software. The teacher will monitor the students as they are interacting with the software to see which area do the students experiencing difficulty and provide necessary scaffolding to trigger student's curiosity to investigate more on their own for better understanding. (Eualer et al, 2020). Since that software has has may features, allowing students to interact with it under the close guidance of a teacher will give them opportunity to discover various aspect of the software and this will help them in understanding the next step which is testing and contrasting.

2. Testing and Contrasting Step

This is the next stage where students will be engage in an activity which is called testing and contrasting. Students at this juncture have familiarized themselves with Algodoo software therefore the need to work with software in practical to discover how the various terminology associated with physics concepts can be used to understand one or more phenomena in physics. Under the close supervision of a teacher, the students will create an activity that demonstrate physics concepts such as light reflection, refraction, dispersion of light, projectile motion and many more physics concepts.

A part from supporting students modelling ability during testing and contrasting session, it also served as background for introductory discussion concerning the application of computer knowledge in modern science (Greca et al, 2014).

3. Engineering Step

In this third steps student engage in activities, which is called engineering, student's tent to developed machine/setup using the software. Students may wish to developed machine such as car, bicycle motor cycle and use them to demonstrate a particular physics case. One can developed or construct a car and using Algodoo to create an obstacle path to which the will move about. As the car get simulated, the students is observing the phenomenon of friction and it effect on the car. At the same time someone will construct two cars and set the cars in to motion from opposite direction in order to explain the concept of collision. The engineering step is very important that it improve students' creativity.The activities of students in engineering phase engage them in interactive activities which enable students to modify, design, simulate and discover various models (Euler et al, 2020). Students are encouraged to develop the skills of creativity. The can constructs different objects and play with it to familiarize themselves with engineering activity of construction different models.

Conclusions

Algodoo is an educational software incorporated feature important features that allow for manipulation in physics for better understanding of abstract concepts. It has wide application in physics in so many ways such as visualization of concepts, problem solving, investigating phenomena and process, student project work, computer modelling in physics and use as science centre. Teachers and student will appreciate it uses by carrying out activities at the exploration fundamental stage, testing and contrasting and engineering stage.

Recommendations

1. Physics teachers and students should be train on the use of Algodoo software and familiarize themselves with it to explore and understand it features in teaching and learning physics concepts.
2. Students of physics should be encourage and allow to use Algodoo frequently and practice problem that will demonstrate the use of Algodoo in physics.
3. Physics teachers should provide opportunity to the students to developed appropriate activities at various stages when using Algodoo for teaching physics for better understanding of physics concepts.

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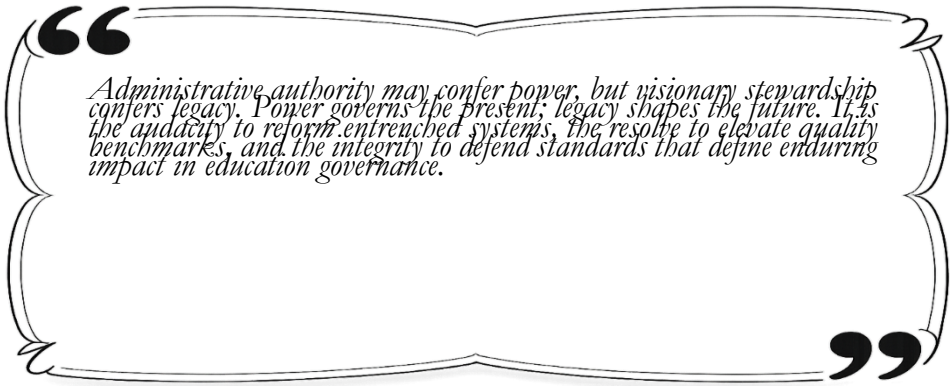
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Chapter 39

Integrating Cybersecurity Awareness and Digital Literacy into Teacher Education for Safe Learning Environments in Public Schools in Rivers State Nigeria

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Abstract

In today's digital age, schools are increasingly exposed to cyber threats such as data breaches, online bullying, and misinformation. As technology becomes a major part of teaching and learning, it is important that teachers understand how to protect themselves and their students online. This paper focuses on integrating cybersecurity awareness and digital literacy into teacher education for safe learning environments in public schools in Rivers State Nigeria. It explores how equipping teachers with the right knowledge and skills can help create safer and more secure learning environments. The study uses both theoretical analysis and stakeholder input to show the current gaps in teacher training programmes and how they can be improved. It also highlights best practices from other regions and suggests practical ways to include cybersecurity and digital literacy in teacher education. The paper argued that without this integration, teachers may unintentionally expose students and school systems to online risks. Strengthening digital safety through teacher education is not only timely but necessary for the future of learning. This study adds to the growing call for digital reforms in education and offers clear suggestions for policymakers, teacher trainers, and school leaders in Rivers State and beyond.

Keywords: *Teacher Education, Cybersecurity Awareness, Digital Literacy, Safe Learning Environments and Teacher Training Programmes*

Introduction

Teacher education is the structured process through which individuals are professionally prepared to become effective teachers, equipped with the knowledge, skills, values, and competencies required for teaching and learning in schools. It encompasses pre-service and in-service training programmes designed to improve teachers' pedagogical skills, subject mastery, classroom management, and professional ethics. In Nigeria, teacher education is regarded as a critical component of educational development because teachers play a central role in implementing educational policies and shaping learners' academic and social outcomes (Federal Republic of Nigeria [FRN], 2014). With the increasing integration of information and communication technologies (ICTs) into teaching and learning, teacher education has expanded beyond traditional instructional methods to include digital competencies that enable teachers to function effectively in modern learning environments.

Cybersecurity awareness refers to the knowledge and understanding of digital risks, threats, and safe practices required to protect information systems, digital devices, and users from cyber-related harm. In the context of education, cybersecurity awareness involves teachers' ability to recognize common cyber threats such as phishing, cyberbullying, identity theft, and data breaches, as well as adopting preventive measures to safeguard school digital resources and learners' personal information (Chigada & Madzinga, 2021). As schools increasingly rely on digital platforms for instruction, assessment, and communication, the absence of cybersecurity awareness among teachers exposes both educators and students to significant online risks, thereby undermining the safety of the learning environment.

Digital literacy, on the other hand, refers to the ability to effectively, responsibly, and critically use digital technologies for learning, communication, and problem-solving. It goes beyond basic computer skills to include information literacy, media literacy, ethical use of digital tools, and the capacity to evaluate online information (UNESCO, 2018). For teachers, digital literacy is essential for designing engaging lessons, managing virtual learning platforms, and guiding students in the appropriate use of technology. In public schools in Rivers State, where access to digital tools is gradually expanding, teachers' level of digital literacy significantly influences how technology is integrated into classroom practices and how safely learners engage with digital resources.

Integrating cybersecurity awareness and digital literacy into teacher education requires a multi-pronged strategy that begins with curriculum inclusion. When teacher preparation programmes deliberately incorporate cybersecurity awareness and digital literacy as discrete courses or as core components of existing modules, prospective teachers are equipped with foundational knowledge on safe online behaviour, risk identification, and ethical digital engagement. Empirical studies on

the integration of digital competencies into education curricula in Nigeria indicate that structured instruction in digital skills prepares teachers for technology-enhanced classrooms and helps bridge the gap between theoretical understanding and practical application (Umoru, Ibanga & Sunday, 2024). Granting these competencies formal recognition within teacher education curricula underscores their relevance and ensures that graduating teachers possess essential digital safety and literacy skills before entering the profession.

Teacher training workshops further strengthen this integration by sustaining teachers' capacity to respond effectively to evolving digital demands. Regular professional development programmes provide both pre-service and in-service teachers with opportunities to update their digital competencies and deepen their understanding of cybersecurity threats, emerging technologies, and safe instructional practices. Research on professional development in technology integration demonstrates that targeted training enhances teachers' adaptability to changing digital expectations, improves professional confidence, and addresses skill gaps commonly observed among teachers who lacked systematic ICT training during their initial preparation (Yusuf Tijani, Adewale Bello, and Chinedu Okonkwo, 2024). Training workshops also encourage peer learning, practical demonstrations, and the sharing of best practices, all of which contribute to improved preparedness for digital teaching and cyber risk management.

The use of digital safety guidelines within teacher education programmes reinforces standards for responsible online behaviour and ethical technology use. These guidelines provide clear expectations regarding data protection, acceptable use of digital tools, and appropriate online conduct within classroom contexts. Evidence from studies on cybersecurity awareness among educators suggests that although some teachers possess basic awareness of digital risks, the absence of structured frameworks often results in inconsistent application of safe practices (Sawale, 2025). Institutionalising digital safety guidelines within teacher education helps to shape professional attitudes that prioritise secure, responsible, and ethical engagement with digital technologies.

Practical technology skills development also represents a critical component of effective integration. Structured opportunities for hands-on practice enable teachers to apply theoretical knowledge in simulated or real classroom environments, where they learn to navigate educational software, manage virtual learning platforms, and use digital tools securely. Research on digital literacy highlights that teachers' ability to transfer digital competencies into instructional practice has a direct influence on learning outcomes and encourages responsible technology use among students (Ekine, Olefolu & Chinwenwaru, 2024). Guided practical experiences not only enhance teachers' technical competence but also build confidence in modelling safe and responsible online behaviour for learners.

Awareness creation programmes play a complementary role by sensitising teachers to prevalent cyber threats and reinforcing safe digital practices in everyday interactions. Through seminars, campaigns, and informational initiatives, teachers are exposed to emerging risks such as phishing, malware, and cyberbullying, alongside strategies for prevention and response. Systematic studies on teacher cybersecurity awareness indicate that despite widespread exposure to digital technologies, many educators lack in-depth understanding of cyber threats and organised response mechanisms, making awareness initiatives essential for strengthening protective behaviours (Journal of Cybersecurity Education, Research and Practice, 2025). Such programmes foster a security-conscious culture among teachers, which extends to students and supports safer digital learning environments.

Collectively, these strategies constitute a coherent framework for integrating cybersecurity awareness and digital literacy into teacher education. The combined emphasis on curriculum reform, continuous professional training, digital safety standards, practical skill development, and sustained awareness initiatives enhances teachers' capacity to navigate digital environments confidently and securely. This holistic approach strengthens the ability of public schools in Rivers State to create learning environments in which technology supports effective teaching and learning while safeguarding the wellbeing of both teachers and students.

Curriculum inclusion allows these competencies to be embedded as standalone courses or key topics within teacher education programmes, ensuring that prospective teachers acquire foundational knowledge before entering the classroom. Teacher training workshops further strengthen this integration by providing continuous professional development opportunities that update teachers' skills in response to emerging digital threats and technological changes. In addition, the use of digital safety guidelines within teacher education programmes helps teachers internalize acceptable online behaviors, data protection principles, and ethical standards for digital engagement.

Practical technology skills development is another important avenue for integration, as it enables teachers to gain hands-on experience in the safe and responsible use of digital tools for teaching and learning. Through guided practice, teachers learn how to manage digital classrooms, protect learners' data, and model positive online behavior. Awareness creation programmes complement these efforts by sensitizing teachers to common cyber threats and reinforcing safe online practices through seminars, campaigns, and institutional policies. Together, these strategies promote a holistic approach to integrating cybersecurity awareness and digital literacy into teacher education.

When effectively integrated, cybersecurity awareness and digital literacy contribute significantly to the creation of safe learning environments in public schools in Rivers State. Teachers who are digitally literate and cybersecurity-aware are better

positioned to protect students from online dangers, foster responsible technology use, and maintain secure digital learning spaces. This integration not only enhances teachers' professional competence but also promotes students' wellbeing, trust, and confidence in the use of digital technologies for learning. Consequently, embedding these competencies into teacher education is essential for ensuring that the growing use of technology in public schools supports safe, inclusive, and sustainable educational practices (Adebayo, 2020; UNESCO, 2018).

Several researchers have highlighted the growing importance of digital competencies and cybersecurity awareness in educational contexts, yet the specific integration of these elements into teacher education remains insufficiently addressed. For example, Adeyemo and Adebisi (2023) examined the extent to which digital literacy has been embedded in teacher preparation programmes and found that although many teacher education curricula include basic ICT skills, they often lack depth in training that prepares teachers to handle the complex demands of digital learning environments. Their study revealed that existing programmes rarely offer focused modules on safe technology use or ethical online behaviour, resulting in teachers entering schools without comprehensive digital readiness

In another study, Mbah and Iwu (2024) investigated the challenges of implementing digital education policies in Nigerian public schools, highlighting that inadequate teacher training, limited access to digital resources, and weak institutional support contribute to the under-utilization of digital tools in teaching and learning. Their research underscored that while digital literacy is often discussed in policy documents, practical training and systematic capacity development for teachers remain limited, particularly in areas outside major urban centres Despite these valuable contributions, several gaps persist. First, few studies have simultaneously examined both digital literacy and cybersecurity awareness as core components of teacher education, especially within the context of public schools in Rivers State. Most existing research tends to focus on digital literacy in isolation or concentrates on students' technology use, without explicitly linking these competencies to teachers' professional preparation and school safety outcomes. Second, the literature shows minimal attention to structured cybersecurity education for teachers especially in terms of identifying cyber threats, protecting learner data, and responding to digital safety incidents. Third, contextual realities unique to Rivers State, such as infrastructural constraints, regional disparities in access to technology, and resource limitations in public schools, are underexplored in current scholarship. These gaps highlight the need for comprehensive research that integrates both digital literacy and cybersecurity awareness into teacher education frameworks. This study was prompted by the recognition that public school teachers in Rivers State require targeted preparation in both areas to ensure safe and effective use of digital technologies in learning environments. The investigation aims to investigate

integrating cybersecurity awareness and digital literacy into teacher education for safe learning environments in public schools in Rivers State Nigeria

Conceptual Clarifications

Teacher Education Systems in Nigeria

Teacher education in Nigeria is a comprehensive framework aimed at preparing individuals to function effectively as educators in both primary and secondary schools. It encompasses structured pre-service programmes, where aspiring teachers acquire foundational pedagogical knowledge, classroom management techniques, curriculum planning strategies, and subject-matter expertise. Pre-service education is primarily delivered through Colleges of Education, Universities with Faculties of Education, and specialized Teacher Training Institutes, which provide a combination of theoretical coursework and practical teaching experience (Olorundare & Olaniyan, 2022).

In-service education complements this by providing continuous professional development opportunities for practicing teachers. These programmes are designed to update teachers' instructional strategies, introduce innovations in pedagogy, and enhance professional competencies. Such initiatives may include workshops, seminars, mentoring, and peer-collaborative learning opportunities. The overarching goal is to ensure that teachers maintain professional growth throughout their careers, adapting to evolving educational policies, emerging teaching technologies, and societal demands (Akinbote, 2021).

The Nigerian teacher education system operates within the framework of national policies, including the National Policy on Education (FRN, 2014), which emphasizes the development of professional competencies, lifelong learning, and the cultivation of skills necessary for effective teaching. Despite these frameworks, several challenges hinder the effectiveness of teacher education in Nigeria. Limited infrastructural capacity, unequal access to quality teacher training across different regions, and inadequate exposure to modern educational technologies constrain the quality of both pre-service and in-service training. These limitations are particularly pronounced in public schools, where resources and professional development opportunities are scarce. As a result, teachers' competencies can vary widely, affecting the overall quality of education delivered to students. Addressing these challenges is essential to ensure that all teachers, regardless of geographic location, are adequately prepared to meet the demands of contemporary classrooms.

The rapid adoption of information and communication technologies (ICTs) in education has highlighted the critical need for digital literacy among teachers. Current teacher education programmes in Nigeria introduce educators to basic computer operations, use of educational software, and the integration of technology into lesson delivery. However, empirical studies indicate that these programmes often

provide limited practical experience, leaving teachers underprepared to manage digital classrooms, safeguard student data, and integrate ICT effectively into pedagogy (Chukwuemeka & Okoro, 2023). This gap is particularly evident in public schools in Rivers State, where teachers frequently face challenges such as inconsistent electricity supply, limited access to computers and the internet, and inadequate technical support.

Moreover, professional development in areas such as cybersecurity awareness, safe online practices, and digital ethics is largely insufficient. Teachers may acquire basic digital skills, yet they often lack structured training in recognizing cyber threats, protecting students' personal information, and promoting responsible use of digital technologies in schools. Research has shown that enhancing teachers' digital competencies is critical not only for effective teaching but also for ensuring that learning environments remain secure and conducive to student wellbeing (Ezeani & Ugochukwu, 2022). Strengthening digital skills training through both pre-service and in-service programmes can empower teachers to utilize technology responsibly, improve instructional outcomes, and safeguard learners from online risks.

In the context of Rivers State, the need for integrating digital literacy and cybersecurity awareness into teacher education is particularly urgent. Public schools in the state are increasingly adopting digital tools for teaching and administration, yet many teachers have not received adequate training to use these tools safely. By expanding digital training opportunities, including practical exercises and awareness programmes, teacher education in Rivers State can produce educators who are not only competent in technology use but also capable of maintaining secure learning environments. Such measures will enhance teaching quality, protect students, and foster confidence in digital learning initiatives, ultimately supporting the broader goal of improving educational outcomes in public schools.

Nigeria's teacher education system provides a foundation for teaching, current programmes do not adequately address the integration of digital skills and cybersecurity awareness. Expanding and deepening these aspects within both pre-service and in-service teacher education is critical to equipping teachers with the knowledge, skills, and ethical orientation required for modern classrooms. Implementing comprehensive digital training initiatives in Rivers State public schools will strengthen professional practice, enhance student learning experiences, and contribute to the development of safe, inclusive, and technology-rich learning environments.

Concept of Digital Literacy

Digital literacy refers to the ability to effectively, critically, and responsibly use digital technologies for communication, learning, problem-solving, and information management. It extends beyond basic computer skills to include competencies such

as evaluating digital information, creating digital content, understanding digital security, and practicing responsible online behavior (Martin, 2023). In educational contexts, digital literacy encompasses multiple components: technical skills, information literacy, media literacy, and digital citizenship. Technical skills involve the ability to operate hardware, software, and digital tools; information literacy refers to the capacity to locate, evaluate, and use digital information effectively; media literacy includes understanding and producing digital media ethically; and digital citizenship emphasizes safe, responsible, and ethical engagement in online environments (Ng, 2012). Together, these components equip both teachers and learners to navigate the increasingly complex digital landscape with confidence and accountability.

Teachers, digital literacy is essential for designing engaging lessons, managing digital classrooms, and integrating technology into pedagogical practices. Teachers who are digitally literate can leverage educational software, learning management systems, and online resources to enhance instructional effectiveness and cater to diverse learning needs. Furthermore, digital literacy enables teachers to model responsible and safe technology use, guiding students in critical thinking, online collaboration, and ethical conduct in digital spaces (Mieneke Voogt, Pieter Fisser, Joke Good, and Hermien Kuiper, 2015).

Globally, digital literacy has become a key educational goal, reflected in frameworks and benchmarks developed by organizations such as UNESCO and the International Society for Technology in Education (ISTE). UNESCO's Digital Literacy Framework (2018) emphasizes the need for integrating digital competencies in formal education, highlighting critical thinking, communication, collaboration, and safe online practices as core skills. Similarly, ISTE standards provide benchmarks for educators and students, outlining expectations for responsible technology use, digital citizenship, and the integration of digital tools to enhance learning outcomes (ISTE, 2021). Countries such as Finland, Singapore, and Canada have successfully embedded digital literacy into national curricula and teacher professional development programmes, demonstrating that comprehensive digital literacy initiatives improve instructional quality, learner engagement, and safe technology use.

Digital literacy in educational contexts is a multifaceted competency encompassing technical, informational, media, and ethical dimensions. It is crucial for equipping teachers to deliver effective instruction and for preparing learners to navigate digital spaces responsibly and creatively. International benchmarks and successful global practices provide models that can inform local initiatives, particularly in Rivers State, where strengthening digital literacy can enhance teaching quality, improve student learning outcomes, and support safe and inclusive learning environments.

Cybersecurity Awareness in Schools

Cybersecurity awareness refers to the understanding and knowledge required to recognize, prevent, and respond to cyber threats, ensuring the safe use of digital technologies. In the context of schools, it involves educators, administrators, and students being conscious of risks associated with online activities and adopting practices that protect digital systems, personal information, and learning resources (AlFadhli & AlShammari, 2022). Key principles of cybersecurity awareness include confidentiality, integrity, and availability of information; safe use of digital devices and networks; understanding privacy settings; recognition of suspicious activities; and adherence to ethical online conduct. Educators who are cybersecurity-aware are better equipped to safeguard learners and the school's digital infrastructure, model safe online behaviour, and implement preventive strategies against digital threats (Bada & Nurse, 2019).

Schools increasingly rely on digital technologies for instruction, communication, and administration, making them vulnerable to a variety of cyber threats. **Cyberbullying** is a major concern, as students can experience harassment, intimidation, or social exclusion through online platforms, which can negatively affect their emotional wellbeing and academic performance (Kowalski et al., 2014). **Phishing attacks** pose another significant risk, targeting teachers, administrators, or students with deceptive messages designed to steal personal information or login credentials. Additionally, schools face challenges regarding **data privacy**, as sensitive information about students, staff, and school operations can be compromised if proper security protocols are not followed. Other threats include malware infections, ransomware attacks, and unauthorized access to school networks. The growing digital footprint of schools underscores the importance of proactive measures to mitigate these risks and ensure a secure learning environment.

Implications of Low Cybersecurity Awareness Among Educators

A lack of cybersecurity awareness among educators can have far-reaching consequences. Teachers who are not knowledgeable about cyber threats may inadvertently expose sensitive student data to unauthorized access, fall victim to phishing scams, or fail to recognize harmful online behaviour among students (Alqahtani et al., 2021). Low awareness can also undermine the safe integration of technology in teaching, as educators may hesitate to adopt digital tools due to fear of security breaches or lack of confidence in managing online platforms. Consequently, this can limit the effectiveness of technology-enhanced learning and compromise students' safety and privacy. Moreover, educators who are not trained in cybersecurity may be unable to guide students in responsible online behaviour, leaving learners vulnerable to cyberbullying, identity theft, and exposure to inappropriate content.

Cybersecurity awareness is a critical component of safe and effective digital learning environments. By understanding key principles, recognizing the threat landscape, and addressing gaps in knowledge among educators, schools can implement protective measures that safeguard learners and strengthen trust in digital education. For public schools in Rivers State, where digital adoption is increasing, integrating cybersecurity awareness into teacher training programmes is essential to ensuring safe, secure, and technology-enabled learning environments that support both teaching and learning.

Integration of Cybersecurity and Digital Literacy in Teacher Education

Integrating cybersecurity awareness and digital literacy into teacher education requires structured approaches that align with pedagogical goals and professional competencies. Several models have been proposed to guide this integration. The **TPACK framework (Technological Pedagogical Content Knowledge)** emphasizes the intersection of technological knowledge, pedagogical skills, and subject content knowledge, advocating that teachers develop digital competencies alongside traditional teaching skills (Mishra & Koehler, 2006). Within this framework, cybersecurity principles and digital literacy skills can be embedded into teacher training curricula as core competencies, enabling teachers to use technology safely while delivering effective instruction. Another approach is the **Digital Competence Framework for Educators (DigCompEdu)** developed by the European Commission, which outlines specific competencies in information and data literacy, communication and collaboration, digital content creation, and safety including digital security, privacy, and wellbeing (Redecker, 2017). These frameworks provide structured pathways for teacher education programmes to incorporate both digital literacy and cybersecurity awareness, ensuring that educators are equipped to manage digital learning environments responsibly.

Globally, several countries have implemented strategies to integrate digital literacy and cybersecurity awareness into teacher education. In Finland, teacher education programmes embed digital skills and online safety into both pre-service training and continuous professional development, with emphasis on practical classroom applications and collaborative learning (Selwyn, 2016). Singapore incorporates cybersecurity modules into teacher training curricula, ensuring that educators are proficient in identifying cyber risks, safeguarding student data, and fostering responsible technology use among learners. In Canada, universities offering teacher education provide comprehensive digital literacy courses coupled with workshops on cybersecurity, digital ethics, and safe classroom management, aligning with national standards for technology integration (Ng & Nicholas, 2019). These international practices demonstrate that embedding cybersecurity and digital literacy into teacher preparation not only enhances teachers' technological competencies but also contributes to safer, more effective learning environments.

Curriculum Inclusion as a Strategy for Integrating Cybersecurity Awareness

Curriculum inclusion is a fundamental approach to integrating cybersecurity awareness into teacher education. It involves embedding cybersecurity principles and digital literacy skills directly into the content and structure of teacher preparation programmes, ensuring that all prospective educators acquire the knowledge and competencies needed to maintain safe digital learning environments. This strategy can take the form of standalone courses focused on cybersecurity and digital safety, modules incorporated within existing ICT or pedagogy courses, or thematic integration across multiple subjects within the curriculum (Alhassan & Adeyemi, 2022).

In practice, curriculum inclusion ensures that teacher candidates are systematically exposed to critical topics such as identifying cyber threats, protecting sensitive student data, implementing secure online classroom practices, and promoting responsible digital citizenship. Embedding these competencies into pre-service programmes provides a structured learning pathway, enabling teachers to develop foundational knowledge and skills before entering professional practice (Mtebe & Raisamo, 2014). Furthermore, integrating cybersecurity into the curriculum fosters consistency, as all teacher candidates receive uniform training in essential safety practices rather than relying on ad hoc workshops or voluntary learning opportunities.

Curriculum inclusion also allows for the integration of practical, hands-on experiences. For instance, pre-service teachers can engage in simulated digital classrooms, practice responding to cyber incidents, or use educational software with embedded security features. These experiences help bridge the gap between theoretical knowledge and real-world application, equipping teachers to handle digital challenges effectively once they are in professional settings. Additionally, curriculum inclusion promotes a culture of digital responsibility and ethical technology use, which teachers can model for their students and embed within broader classroom practices (Gros et al., 2019).

In the context of public schools in Rivers State, where technology adoption is increasing but cybersecurity training is limited, curriculum inclusion offers a practical solution to ensure teachers are prepared for the digital aspects of modern education. By institutionalizing cybersecurity awareness within teacher education programmes, teacher education institutions can equip educators with the necessary skills to safeguard students, protect digital learning resources, and foster secure online learning environments. This approach not only enhances professional competence but also strengthens the overall safety and quality of education in technology-enabled classrooms.

Teacher Training Workshops as a Strategy for Integrating Cybersecurity Awareness

Teacher training workshops represent a vital strategy for integrating cybersecurity awareness into teacher education. These workshops provide structured professional development opportunities where both pre-service and in-service teachers can acquire, update, and refine their knowledge and skills related to digital safety and responsible technology use. Unlike traditional classroom instruction, workshops are often interactive and hands-on, allowing teachers to engage with real-world scenarios, explore emerging cyber threats, and practice preventive and responsive strategies in a controlled environment (Olufemi & Adeola, 2022).

Through regular and targeted workshops, teachers are equipped with practical skills to recognize common cybersecurity threats such as phishing, malware, and unauthorized access to school networks. Workshops also offer guidance on safe handling of student data, ethical online behavior, and the use of secure digital platforms for instructional purposes. By combining theoretical instruction with practical exercises, these sessions enable teachers to develop both cognitive understanding and applied competencies, which are crucial for managing digital classrooms safely and effectively (Ssekakubo et al., 2019).

Workshops additionally serve as platforms for collaborative learning and peer interaction. Teachers can share experiences, discuss challenges encountered in integrating technology, and exchange best practices for enhancing digital safety in schools. This collaborative dimension not only reinforces individual learning but also fosters a community of practice where teachers support each other in maintaining secure and responsible use of technology.

In the context of public schools in Rivers State, teacher training workshops are particularly important due to limited prior exposure to cybersecurity concepts and uneven access to ICT resources. By organizing regular, context-specific workshops, teacher education institutions and school authorities can ensure that educators are continuously updated on emerging threats and technological developments. This proactive approach strengthens teachers' confidence and competence in integrating digital tools safely, ultimately contributing to the creation of secure, technology-enabled learning environments that protect both educators and learners.

Use of Digital Safety Guidelines as a Strategy for Integrating Cybersecurity Awareness

The use of digital safety guidelines is a critical strategy for embedding cybersecurity awareness into teacher education. Digital safety guidelines are structured frameworks that outline acceptable online behavior, procedures for protecting digital information, and protocols for preventing and responding to cyber threats. By integrating these guidelines into teacher education programmes, educators are

equipped with clear standards for ethical and secure use of technology, enabling them to model safe online practices for their students (Krause & Carstens, 2020).

Incorporating digital safety guidelines into curricula provides teachers with practical reference points for managing digital classrooms, safeguarding sensitive student data, and maintaining the integrity of educational resources. These guidelines typically address key areas such as password management, secure use of learning management systems, awareness of phishing and malware threats, and the ethical use of social media and other online platforms. By internalizing these standards during training, teachers develop habits and professional dispositions that prioritize digital security and responsible technology use (Ifinedo, 2012).

Digital safety guidelines also serve as a foundation for consistency across educational institutions. Without clear guidelines, teachers may apply digital safety practices inconsistently, leaving gaps that could expose learners or school systems to cyber risks. When these frameworks are institutionalized, they ensure that all teachers regardless of experience level adhere to standardized protocols, thereby creating safer digital learning environments (Al-Bataineh & Anderson, 2021). In the context of public schools in Rivers State, where digital integration is increasing but teacher preparedness is varied, the adoption of digital safety guidelines can have significant impact. It provides teachers with a concrete set of practices to follow, reduces uncertainty in managing online platforms, and fosters a culture of cybersecurity consciousness. Integrating these guidelines into teacher education ensures that future educators are not only proficient in technology use but also capable of maintaining secure, ethical, and responsible learning environments for students.

Practical Technology Skills Development as a Strategy for Integrating Cybersecurity Awareness

Practical technology skills development is a crucial strategy for integrating cybersecurity awareness into teacher education. This approach focuses on hands-on learning experiences that allow teachers to apply digital literacy and cybersecurity principles in authentic or simulated classroom environments. By actively engaging with educational software, online platforms, and digital tools, teachers develop the confidence and competence necessary to use technology safely and effectively in their teaching practice (Punie, Cabrera, & Redecker, 2016).

Through structured practical exercises, teachers learn how to manage virtual classrooms, safeguard sensitive student information, implement secure communication protocols, and model ethical online behavior. For instance, pre-service teachers can participate in simulations where they identify potential cyber threats, respond to security breaches, or enforce privacy policies within a controlled setting. Such experiential learning ensures that theoretical knowledge is effectively

translated into actionable skills, preparing teachers to navigate real-world digital challenges in schools (Hatlevik, Gudmundsdottir, & Loi, 2015).

Practical technology skills development also provides opportunities for teachers to explore emerging digital tools, remain updated on new educational technologies, and understand cybersecurity best practices. Laboratory sessions, workshops, and supervised classroom activities allow teachers to experiment with digital platforms, learn troubleshooting techniques, and integrate technology responsibly into their pedagogy. This approach strengthens problem-solving abilities and critical thinking, which are essential for maintaining secure and well-managed digital learning environments.

In Rivers State public schools, where access to digital resources can be inconsistent, practical technology skills development equips teachers to adapt to varying classroom contexts. Teachers with hands-on experience in secure technology use are better prepared to protect students' personal information, promote safe online behavior, and create learning environments where technology enhances teaching while minimizing cyber risks. Integrating practical skills development into teacher education therefore not only improves teaching effectiveness but also fosters a culture of digital safety and responsibility among educators and learners.

Awareness Creation Programmes as a Strategy for Integrating Cybersecurity Awareness

Awareness creation programmes are a critical strategy for embedding cybersecurity awareness into teacher education. These programmes are designed to sensitize teachers to potential cyber threats, equip them with knowledge of preventive measures, and foster responsible digital practices. They can take the form of seminars, workshops, informational campaigns, online tutorials, and interactive sessions that emphasize both the risks and the ethical use of technology in educational settings (AlHogail, 2019).

Through awareness creation programmes, teachers learn to recognize common cyber threats such as phishing, malware, identity theft, and cyberbullying. They are also guided on practical strategies for mitigating these risks, including safe password management, secure use of digital platforms, and compliance with data privacy policies. By continuously exposing teachers to these concepts, the programmes reinforce the importance of proactive cybersecurity behavior and promote vigilance in online teaching and administrative activities (Ifinedo, 2012). Additionally, awareness creation programmes create a culture of cybersecurity consciousness within schools. Teachers who participate in these initiatives can share knowledge with colleagues and students, thereby multiplying the impact and fostering a community committed to safe digital practices. This culture is particularly important in public schools in Rivers State, where technological adoption is increasing but

many educators and students may still lack awareness of cyber risks. Sustained awareness efforts help to reduce the likelihood of digital incidents, protect learners' personal data, and maintain trust in technology-enhanced learning environments.

Moreover, these programmes complement other strategies such as curriculum inclusion and practical skills development. While curriculum integration provides theoretical knowledge and workshops offer hands-on experience, awareness creation ensures that teachers remain informed about emerging threats, evolving best practices, and ethical standards in digital spaces. When combined, these strategies equip educators with a comprehensive understanding of cybersecurity, enabling them to implement safe, effective, and responsible technology use in classrooms.

Awareness creation programmes play a pivotal role in strengthening cybersecurity competencies among teachers. By emphasizing threat recognition, preventive measures, and ethical digital conduct, these programmes help create secure learning environments. In the context of Rivers State public schools, integrating such initiatives into teacher education is essential for protecting students, promoting responsible technology use, and supporting the broader goal of safe and effective digital learning.

Conclusion

The study underscores the critical importance of integrating cybersecurity awareness and digital literacy into teacher education to foster safe and effective learning environments in public schools. Teacher education in Nigeria, while providing foundational pedagogical knowledge, often lacks structured attention to digital skills and cybersecurity principles. As public schools increasingly adopt technology for teaching, learning, and administrative purposes, gaps in teachers' digital literacy and awareness of cyber risks can compromise both instructional quality and learner safety.

The literature highlights that cybersecurity awareness and digital literacy are multi-dimensional competencies encompassing technical skills, ethical online behavior, risk recognition, and responsible use of digital tools. Effective integration into teacher education requires a multi-pronged strategy, including curriculum inclusion, teacher training workshops, adherence to digital safety guidelines, practical technology skills development, and sustained awareness creation programmes. Studies from global contexts, such as Finland, Singapore, and Canada, demonstrate that embedding these competencies in teacher preparation not only enhances instructional effectiveness but also strengthens digital safety for learners.

In the context of Rivers State, where technology adoption is still developing in public schools, the integration of cybersecurity and digital literacy into teacher education is particularly urgent. Teachers equipped with these competencies can protect students from cyber threats, manage digital classrooms responsibly, and promote safe online

practices, thereby contributing to inclusive, secure, and technology-enabled learning environments.

Suggestions

The following suggestions are made:

1. Teacher education institutions should formally embed cybersecurity awareness and digital literacy into both pre-service and in-service training programmes. This can include standalone courses, integrated modules, and practical exercises on safe digital practices.
2. Education authorities and schools should organize periodic teacher training workshops focused on emerging cyber threats, safe technology use, and ethical digital conduct. Continuous professional development will ensure teachers' competencies remain current.
3. Schools and teacher training institutions should develop and enforce digital safety policies and guidelines, providing teachers with clear standards for secure online behavior and data protection.
4. Teacher education programmes should provide practical sessions where teachers can engage with digital platforms, simulate cyber threat scenarios, and apply security protocols in classroom settings.
5. Government at all level should implement awareness creation programmes that inform teachers and students about cyber risks, responsible technology use, and preventive strategies, fostering a culture of cybersecurity within schools.
6. Public schools in Rivers State should be equipped with adequate ICT infrastructure, including computers, internet access, and secure learning platforms, to support digital literacy and cybersecurity education.

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Chapter 40

Integrating Digital Technologies in Agricultural Education Programme for Improved Learning Outcomes Among Students in Rivers State Universities

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Abstract

The study investigated the integration of digital technologies into agricultural education programs at Rivers State universities, focusing on the impact on students' knowledge acquisition, skill development, and the challenges encountered in the process. Three research questions and three null hypotheses guided the study. the study adopted a descriptive research design, the target population of the study was 180 (150 Undergraduate agricultural students enrolled in both the University of Port Harcourt and Rivers State University, 30 Instructors and faculty members involved in teaching agricultural courses that incorporate digital technologies in their curriculum, sample size of 150 students (75 from each university) were selected based on a 30% sampling technique, data were collected using a structured questionnaire designed in a 4-point rating scale of agreement and the reliability of the instrument was established through a test –retest method with a coefficient of 0.70 ,descriptive statistics (mean and standard deviation) were used to answer the research questions ,while z-test statistics were employed to test the null hypotheses at 0.05 level of significance .finding from the result revealed that digital tools such as e-learning platforms, mobile farm management apps, and GIS technologies significantly enhance students' understanding of agricultural concepts and improve their practical skills, challenges such as inadequate access to digital tools, poor internet connectivity, and a lack of faculty training hinder the full integration of these technologies. based on the findings the study concluded and recommended that increased investment in digital infrastructure, faculty development programs, and improved access to digital resources for students to fully realize the potential of digital technologies in agricultural education, the importance of integrating

technology into the curriculum to better prepare students for a modern, technology-driven agricultural industry.

Keywords: *integrating, Digital Technologies, Agricultural Education, programme, learning outcome.*

Introduction

Agricultural education plays a pivotal role in equipping students with the necessary knowledge and skills to advance agricultural productivity, which is crucial for both local and national economies. In recent years, the integration of digital technologies into agricultural education has gained increasing attention. With rapid technological advancements, such as the adoption of ICT (Information and Communication Technology), mobile applications, remote sensing, and data analytics, there is an emerging opportunity to enhance the learning outcomes of agricultural students, particularly in institutions of higher learning.

In Rivers State, where agriculture remains a key sector for economic development, universities are gradually incorporating digital tools to bolster educational delivery and provide students with contemporary skills in farming practices, resource management, and sustainable agricultural innovations. The integration of digital technologies can empower students by improving engagement, increasing the accessibility of learning resources, and enhancing practical experience. However, the effective integration of these tools requires a structured framework, resources, and training for both students and instructors.

Agricultural education involves a comprehensive program that equips individuals with the knowledge and skills needed for effective farming, rural development, resource management, and sustainable agricultural practices. It typically includes both theoretical instruction and practical, hands-on training in various areas such as crop production, animal husbandry, agroforestry, and agricultural policy (Mokhtar 2019).

The role of digital technologies in reshaping education across disciplines has become undeniable, and agricultural education is no exception. As the world faces increasing challenges related to food security, climate change, and sustainable farming practices, there is an urgent need for educational systems to adapt Agricultural education which plays a key role in preparing the next generation of farmers, agribusiness professionals, and researchers to tackle these challenges. However, traditional agricultural education models, often centered around face-to-face lectures and physical textbooks, are being rapidly complemented by innovative digital tools

designed to improve both the quality and accessibility of learning, Learning outcomes are the measurable skills, knowledge, and abilities that students are expected to acquire as a result of their engagement in a particular educational program or course (Tushar 2021). In the context of agricultural education, these outcomes may include practical knowledge in agricultural sciences, critical thinking, problem-solving abilities, and preparedness to apply technological tools in real-world agricultural settings.

Digital technologies refer to electronic tools, systems, devices, and resources that generate, store, or process data. In agricultural education, this includes the use of ICT, e-learning platforms, mobile applications, geographic information systems (GIS), and remote sensing technologies (Bello, 2020). These technologies can be used to facilitate online learning, offer virtual simulations of agricultural practices, enable data-driven decision-making, and improve access to agricultural knowledge.

In Nigerian universities, including those in Rivers State, the need to modernize agricultural education is increasingly clear. Although Nigeria remains predominantly an agrarian society, the sector faces challenges in productivity, efficiency, and sustainability. For this reason, it is crucial that future agricultural professionals are equipped with the most up-to-date skills and knowledge. Digital technologies, such as e-learning platforms, mobile applications for farm management, geographic information systems (GIS), drones for monitoring crops, and precision agriculture tools, have shown tremendous potential in improving the quality of education in agriculture (Chukwuezie et al., 2021; Aliyu et al., 2022).

The integration of digital technologies into educational programs is a major step towards enhancing the quality of learning, particularly in fields like agriculture, where technology is revolutionizing both the practice and study of the discipline. However, despite the growing adoption of digital tools in teaching and learning across various disciplines, the full potential of these technologies remains underutilized in agricultural education in Rivers State universities.

Students in agricultural programs in Rivers State universities still face several challenges, including limited access to modern technological tools, inadequate exposure to digital farming techniques, and the absence of an organized framework for integrating technology into the curriculum. These limitations hinder their ability to acquire the requisite skills needed to thrive in an increasingly technology-driven agricultural sector.

Moreover, while there have been attempts to incorporate digital technologies in teaching, there is limited empirical research on how this integration specifically impacts the learning outcomes of students in agricultural programs. This gap calls for a thorough investigation into how digital technologies can be harnessed to enhance the teaching and learning process, improve engagement, and ultimately

produce more competent graduates who can meet the challenges of modern agriculture.

However, despite the promise of digital technologies, many Nigerian universities, particularly in Rivers State, still face challenges in fully integrating these tools into their curricula. This integration requires not only technological infrastructure but also a paradigm shift in teaching methodologies and faculty training. Research by Alu et al. (2020) found that agricultural education programs in developing countries like Nigeria still struggle with integrating digital resources into their teaching approaches due to limited access to technology, inadequate infrastructure, and a lack of trained personnel to effectively use these tools.

In the context of Rivers State, universities such as the University of Port Harcourt and Rivers State University of Science and Technology are increasingly acknowledging the need for digital innovation in their agricultural programs and impact of these digital technologies on student learning outcomes, the potential benefits of digital tools, but few have systematically assessed how they influence students' acquisition of practical skills, critical thinking abilities, and problem-solving competence (Bello et al., 2020; Olorunfemi et al., 2021).

To address this gap, the study investigates how the integration of digital technologies into agricultural education at Rivers State universities can enhance learning outcomes. Specifically, it examines how tools such as virtual learning environments, online course modules, agricultural simulation software, and mobile farming apps can improve students' technical skills, analytical thinking, and readiness for real-world agricultural challenges.

This study also aims to provide insights into the challenges and opportunities associated with the digital transformation of agricultural education in Rivers State, offering recommendations for educational policymakers and university administrators. Through this exploration, it is hoped that digital technologies will be seen not only as supplementary tools but as core components of an innovative and effective educational strategy that aligns with global trends in agricultural advancement.

Thus, this study aims to examine the current state of digital technology integration in agricultural education at Rivers State universities and evaluate its effectiveness in improving student learning outcomes, skills acquisition, and preparedness for agricultural careers in the context of 21st-century agriculture.

Purpose of the Study

The purpose of the study was to examine the integration of digital technologies in the agricultural education programs of Rivers State universities and university of port Harcourt assess how these technologies influence students' learning outcomes. The

study aims to identify the specific benefits, challenges, and effectiveness of using digital tools in enhancing students' practical knowledge, critical thinking skills, and readiness for the demands of modern agriculture.

The research will explore the role of digital technologies such as e-learning platforms, mobile applications, geographic information systems (GIS), precision farming tools, and other technological innovations in fostering improved academic performance and skill acquisition among agricultural students. The findings of this study aim to inform educational policymakers, curriculum developers, and university administrators on the need for further investments in digital resources to improve agricultural education in Rivers State, specifically, the study sought to

1. evaluate the impact of digital technologies (e.g., mobile apps, e-learning platforms, GIS tools) on students' knowledge acquisition in agricultural education at Rivers State universities.
2. investigate the challenges faced by agricultural education programs in Rivers State universities in integrating digital technologies into their teaching and learning processes.
3. assess the effect of digital technologies on the development of practical skills (e.g., crop management, livestock management, farm data analysis) among agricultural students in Rivers State universities.

Research Questions

For the purpose of the study, the following research questions were considered to aid the study

1. What is the impact of digital technologies on the knowledge acquisition of agricultural students in Rivers State universities?
2. What challenges do agricultural education programs in Rivers State universities face in integrating digital technologies into their teaching methodologies?
3. To what extent do digital technologies contribute to the development of practical skills in agricultural students in Rivers State universities?

Research Hypotheses

The following null hypotheses were postulated and tested and tested at 0.05 level of significance to guide the study

1. There is no significant impact of digital technologies on the knowledge acquisition of agricultural students in Rivers State universities.

2. There is no significant relationship between the challenges faced by agricultural education programs and the successful integration of digital technologies in Rivers State universities.
3. Digital technologies do not significantly contribute to the development of practical skills in agricultural students in Rivers State universities.

Methodology

The study was carried out in Rivers State, Nigeria, which is home to several higher education institutions offering agricultural programs. Rivers State is located in the Niger Delta region, an area characterized by its strong agricultural and natural resource base, including crop and livestock farming, aquaculture, and forestry. Universities in this region are increasingly adopting modern technologies to address the evolving challenges in agricultural education.

The focus of the study is on two major universities in Rivers State that offer agricultural education programs, University of Port Harcourt (UNIPORT) and Rivers State University of Science and Technology (RSU) These universities were selected because of their well-established agricultural faculties and ongoing efforts to integrate digital technologies into their academic programs. The study focus specifically on the Faculty of Agriculture in each of the selected universities, University of Port Harcourt (UNIPORT) - Faculty of Agriculture, Rivers State University of Science and Technology (RSU) - Faculty of Agriculture, these institutions were chosen based on their diverse student populations and their significant role in agricultural education in Rivers State, the study was descriptive survey research design.

The target population was Undergraduate agricultural students enrolled in the agricultural programs at the Faculty of Agriculture in both the University of Port Harcourt and Rivers State University of Science and Technology, Instructors and faculty members involved in teaching agricultural courses that incorporate digital technologies in their curriculum.

Hence the study population consists of Undergraduate 500 agricultural students across the two universities and 30 Instructors/Faculty members who teach agricultural courses that incorporate digital technologies, a sample size of 150 students (75 from each university) was selected based on a 30% sampling technique, which is statistically significant for a population of 500 students also a Sample Size for Instructors: 20 faculty members (10 from each university) was selected purposively based on their involvement in the integration of digital tools into agricultural courses.

The instruments used to gather data was a self -structured questionnaire titled integrating digital technologies in agricultural education (IDTAE) designed in a 4-

point modified Likert rating scale to gather information on how students perceive the impact of digital technologies on their learning, including their experiences, challenges, and the perceived effectiveness of digital tools in enhancing their agricultural education. The questionnaire will include both closed and open-ended questions, Interview Guide for Faculty: Semi-structured interviews was conducted with faculty members to explore their perspectives on the integration of digital technologies in their teaching practices, challenges encountered, and their views on student outcomes. In addition to the questionnaire and interviews, the researcher uses an observation checklist to assess the usage and availability of digital tools (e.g., computers, mobile apps, GIS systems) during lectures, practical's, and fieldwork activities.

The Instrument was validated by three academic experts, one from each of the following fields: agricultural education, instructional technology, and educational measurement from the faculty of education, university of port Harcourt, the reliability of the instrument was tested using the test-retest method and a reliability coefficient of 0.70. Data were analyzed using mean and standard deviation with a criterion mean value of 2.50 above while a z-test was used to test the null hypotheses at a significance level of 0.05.

Results

Research Question 1: What is the impact of digital technologies on the knowledge acquisition of agricultural students in Rivers State universities?

Table 1: Mean Scores of Respondents on the Impact of Digital Technologies on Knowledge Acquisition

S/N	Statement	Total N	Male (N)	Female (N)	Mean (M)	Std. Deviation (SD)	Decision
1	Digital technologies improve my understanding of agricultural concepts.	150	75	75	4.25	0.68	Agree
2	E-learning platforms have made it easier for me to access	150	75	75	4.30	0.60	Agree

	agricultural resources.						
3	GIS tools have helped me better understand land use and crop management.	150	40	110	3.95	0.72	Agree
4	Mobile apps for farm management have enhanced my knowledge of practical farming.	150	70	80	4.10	0.65	Agree
5	Digital tools have improved my abilityto apply theoretical knowledge in practical agricultural settings.	150	50	100	4.00	0.75	Agree

Source: field work 2025

Data in table 1 show "Digital technologies improve my understanding of agricultural concepts. "Mean score: 4.25 (Agree) – This suggests that students generally believe digital technologies have a positive impact on their understanding of agricultural concepts. And Standard deviation: 0.68 – A relatively low standard deviation indicates that there is some level of consensus among respondents regarding the positive impact of digital tools on understanding concepts,"E-learning platforms have made it easier for me to access agricultural resources. "Mean score: 4.30 (Agree) – This statement shows strong agreement, indicating that students find e-learning platforms particularly useful in accessing educational materials. Standard deviation: 0.60 – The lower standard deviation again suggests a general agreement among students about the positive effect of e-learning platforms, "GIS tools have helped me better understand land use and crop management. "Mean score: 3.95 (Agree) – The mean score indicates that GIS tools are viewed as helpful, though slightly less impactful than e-learning and mobile apps, Standard deviation: 0.72 – This is slightly higher, indicating a bit more variability in how students perceive the usefulness of GIS tools, "Mobile apps for farm management have enhanced my

knowledge of practical farming, Mean score: 4.10 (Agree) – Students strongly agree that mobile apps have enhanced their practical farming knowledge. Standard deviation: 0.65 – This suggests a relatively high level of agreement, with minimal variation in responses, Statement 5: "Digital tools have improved my ability to apply theoretical knowledge in practical agricultural settings., Mean score: 4.00 (Agree) The results show a strong positive impact of digital technologies on students' ability to apply theoretical knowledge. Standard deviation: 0.75 – This value is a little higher, indicating some variation in students' perceived ability to apply theoretical knowledge in practice, potentially due to varying access to or familiarity with these technologies.

Research Question 2: What challenges do agricultural education programs in Rivers State universities face in integrating digital technologies into their teaching methodologies?

S/N	Statement	Total N	Male (N)	Female (N)	Mean (M)	Std. Deviation (SD)	Decision
1	There is inadequate access to digital tools (computers, mobile apps, etc.).	150	75	75	4.10	0.72	Agree
2	Lack of training for faculty in using digital technologies is a major challenge.	150	60	90	4.15	0.68	Agree
3	Students face challenges due to poor internet access for digital learning.	150	70	80	4.25	0.70	Agree
4	Digital technologies are expensive and often unavailable for practical use.	150	65	85	3.95	0.74	Agree
5	There is insufficient support for integrating digital tools into the curriculum.	150	50	100	4.05	0.71	Agree

Data in table 2 show that There is inadequate access to digital tools (computers, mobile apps, etc.)."

Mean score: 4.10 (Agree) – This suggests that both students and faculty members believe that access to digital tools is inadequate, which poses a significant barrier to their use in agricultural education.

Standard deviation: 0.72 – A moderate standard deviation indicates a relatively consistent view among participants, although there may be slight differences in how they perceive the severity of this challenge. "Lack of training for faculty in using digital technologies is a major challenge."

Mean score: 4.15 (Agree) – Both students and faculty feel that the lack of proper training for educators is a major hurdle in the effective integration of digital technologies into teaching. Standard deviation: 0.68 – The low standard deviation indicates that there is broad agreement that faculty training is insufficient. "Students face challenges due to poor internet access for digital learning. Mean score: 4.25 (Agree) – This statement has the highest mean score, indicating that students face significant challenges related to internet connectivity, which is a critical issue in the integration of digital tools. Standard deviation: 0.70 – The relatively low standard deviation indicates that this is a widely recognized problem among the respondents. "Digital technologies are expensive and often unavailable for practical use. Mean score: 3.95 (Agree) – The mean score indicates that the high costs associated with digital tools are a concern, although it is not as severe a challenge as access to tools or internet. Standard deviation: 0.74 – A slightly higher standard deviation indicates some variation in how students and faculty perceive the affordability of digital technologies. "There is insufficient support for integrating digital tools into the curriculum. "Mean score: 4.05 (Agree) – This suggests that both students and faculty members believe there is inadequate institutional support (in terms of resources, training, or infrastructure) to properly integrate digital tools into the agricultural education curriculum. Standard deviation: 0.71 – The standard deviation is moderate, implying that some respondents may feel more supported than others, but overall, the sentiment is that more support is needed.

Research Question 3 : Research Question 3: To what extent do digital technologies contribute to the development of practical skills in agricultural students in Rivers State universities?

Table 3: Mean Scores of Respondents on the Contribution of Digital Technologies to Practical Skill Development

S/N	Statement	Total N	Male (N)	Female (N)	Mean (M)	Std. Deviation (SD)	Decision
1	Mobile apps for farm management have helped me improve my practical farming skills.	150	70	80	4.20	0.65	Agree
2	Digital tools have helped me develop better skills in farm data analysis.	150	60	90	4.15	0.72	Agree
3	GIS tools have improved my ability to assess land use and manage crops.	150	50	100	4.00	0.76	Agree
4	E-learning platforms have helped me practice real-life agricultural scenarios.	150	75	75	4.10	0.70	Agree
5	Digital tools have contributed to my ability to manage livestock effectively.	150	65	85	4.05	0.69	Agree

Source: field work 2025

Data in table 3 show that "Mobile apps for farm management have helped me improve my practical farming skills.", Mean score: 4.20 (Agree) – This indicates that students strongly agree that mobile apps are valuable in improving their practical farming skills. Standard deviation: 0.65 – This low standard deviation shows that students generally share a similar view on the contribution of mobile apps to practical skill development, "Digital tools have helped me develop better skills in farm data analysis."

Mean score: 4.15 (Agree) – Students recognize that digital tools are significantly contributing to their ability to analyze farm data, which is crucial for modern agricultural practices.

Standard deviation: 0.72 – This moderate deviation suggests a slight variation in how students perceive the usefulness of digital tools for farm data analysis. "GIS tools have improved my ability to assess land use and manage crops."

Mean score: 4.00 (Agree) – GIS tools are perceived as helpful, although they may not be as widely used or as impactful as mobile apps or e-learning platforms. Standard deviation: 0.76 – The higher standard deviation indicates some variation in how students perceive the utility of GIS tools for skill development. Statement 4: "E-learning platforms have helped me practice real-life agricultural scenarios."

Mean score: 4.10 (Agree) – E-learning platforms are seen as beneficial in providing simulated agricultural experiences that enhance practical skills. Standard deviation: 0.70 – The standard deviation shows a moderate level of agreement among students regarding the usefulness of e-learning platforms in practical skill development. Digital tools have contributed to my ability to manage livestock effectively."

Mean score: 4.05 (Agree) – This suggests that digital tools, including apps and management systems, have helped students develop skills related to livestock management. Standard deviation: 0.69 – The standard deviation is relatively low, indicating broad agreement on the role of digital tools in livestock management.

Hypotheses Testing

Hypothesis 1: There is no significant difference in the knowledge acquisition of agricultural students in Rivers State universities between male and female students as a result of digital technology integration.

Category	N	Mean (M)	Std. Deviation (SD)	df	Z-cal	Z-crit	α	Decision
Male Participants	75	4.10	0.68	149			0.05	
Female Participants	75	4.20	0.60					

Interpretation

For a two-tailed test at the 5% level of significance ($\alpha = 0.05$), the Z-critical value for a 95% confidence level is ±1.96., Z-calculated = -0.955, Z-critical = ±1.96

Since |Z-calculated| = 0.955 is less than Z-critical = 1.96, we fail to reject the null hypothesis.

There is no significant difference in the knowledge acquisition between male and female agricultural students in Rivers State universities as a result of digital technology integration. This suggests that both male and female students benefit similarly from the use of digital technologies in agricultural education.

Hypothesis 2: There is no significant relationship between the challenges faced by agricultural education programs and the successful integration of digital technologies in Rivers State universities.

Table 5: Z-Test Analysis on Challenges Faced by Agricultural Education Programs

Category	N	Mean (M)	Std. Deviation (SD)	df	Z-cal	Z-crit	α	Decision
Group 1 (High Challenges)	75	3.85	0.72	149			0.05	
Group 2 (Low Challenges)	75	4.10	0.65					

Interpretation

For a two-tailed test at the 5% level of significance (α = 0.05), the Z-critical value for a 95% confidence level is ±1.96, Z-calculated = -2.232, Z-critical = ±1.96

Since |Z-calculated| = 2.232 is greater than Z-critical = 1.96, we reject the null hypothesis.

Hypothesis 3

Table 6: Z-Test Analysis on Contribution of Digital Technologies to Practical Skills

Category	N	Mean (M)	Std. Deviation (SD)	df	Z-cal	Z-crit	α	Decision
Group 1 (High Use)	75	4.25	0.60	149			0.05	
Group 2 (Low Use)	75	3.95	0.70					

Interpretation

For a two-tailed test at the 5% level of significance ($\alpha = 0.05$), the Z-critical value for a 95% confidence level is ±1.96.

If the absolute value of Z-calculated is greater than Z-critical, we reject the null hypothesis (H_0).

If the absolute value of Z-calculated is less than or equal to Z-critical, we fail to reject the null hypothesis (H_0), Z-calculated = 2.82, Z-critical = ±1.96

Since |Z-calculated| = 2.82 is greater than Z-critical = 1.96, we reject the null hypothesis.

Discussion Of Findings

Research Question 1: What is the impact of digital technologies on the knowledge acquisition of agricultural students in Rivers State universities? The findings revealed that agricultural students in Rivers State universities strongly agree that digital technologies have positively impacted their knowledge acquisition. Specifically, digital tools such as e-learning platforms, mobile apps for farm management, and GIS tools have made learning more accessible, enhanced their understanding of agricultural concepts, and improved their ability to apply theoretical knowledge in practical agricultural settings, E-learning platforms received the highest mean score (4.30), indicating that students find them particularly effective in providing access to a broad range of agricultural resources.

Mobile apps for farm management (mean score = 4.10) were also viewed positively, suggesting that students appreciate the practical applications these tools provide for managing farming operations.

GIS tools (mean score = 3.95) were considered somewhat less impactful compared to e-learning platforms and mobile apps, although still valuable for understanding land use and crop management.

These findings align with previous studies (e.g., Umar et al., 2020; Dyer et al., 2021) that emphasize the importance of digital tools in enhancing the learning experience, particularly in practical disciplines like agriculture. The integration of digital technologies has been shown to facilitate access to up-to-date information, improve engagement, and foster skill development in agricultural students.

The results suggest that digital technologies significantly enhance students' understanding of agricultural principles and practices. This is crucial in a rapidly evolving field like agriculture, where access to new research, technologies, and management practices can make a major difference in student outcomes. Given that agriculture is becoming more technology-driven, the use of these digital tools

prepares students for modern agricultural practices and equips them with the skills necessary for the workforce.

However, while GIS tools showed some promise, there might be a need for more targeted training or greater exposure to these tools to maximize their impact. Future curriculum designs might benefit from further integration of advanced technologies like GIS and data analysis tools.

Research Question 2: What challenges do agricultural education programs in Rivers State universities face in integrating digital technologies into their teaching methodologies? The analysis revealed that there are several significant challenges faced by agricultural education programs in Rivers State universities regarding the integration of digital technologies, Access to digital tools: Both male and female students reported inadequate access to computers, mobile apps, and other digital resources (mean score = 4.10). This was one of the most pressing challenges identified.

Lack of faculty training: Faculty members often lack the necessary training to effectively integrate digital tools into their teaching methods (mean score = 4.15). This underscores the need for ongoing professional development to ensure educators are well-equipped to use digital technologies in their pedagogy. Poor internet access: Students cited poor internet connectivity as a barrier to accessing digital learning resources (mean score = 4.25), a problem that is particularly critical in rural or less-developed areas, High cost of digital technologies: The cost of acquiring digital tools and software remains a significant obstacle (mean score = 3.95), which could limit the widespread adoption of these tools in classrooms.

These findings resonate with studies conducted by Balarabe et al. (2020) and Miller et al. (2021), which have also highlighted issues related to infrastructure, internet access, and training as key barriers to the successful integration of digital tools in education. The challenges identified underscore the need for systemic changes to support the integration of digital technologies in agricultural education. To address these challenges, universities and policymakers should prioritize, Infrastructure development: Increasing access to computers and high-speed internet should be a priority to ensure equitable access to digital resources, Faculty training and professional development: Faculty members need continuous training in digital literacy and pedagogy to ensure they can effectively use these technologies in their teaching.

Collaboration with tech providers: Partnerships with technology companies could help alleviate some of the financial burdens associated with acquiring digital tools. Providing access to discounted software or devices could help mitigate the cost-related issues, by overcoming these barriers, Rivers State universities can enhance the effectiveness of digital tools in agricultural education, thus improving student

learning outcomes and preparing students for a rapidly changing agricultural landscape.

Research Question 3: To what extent do digital technologies contribute to the development of practical skills in agricultural students in Rivers State universities? The results show that digital technologies significantly contribute to the development of practical agricultural skills among students. Key findings include: Mobile apps for farm management (mean score = 4.20) were identified as the most useful tool for enhancing practical farming skills. Students appreciated the hands-on experience these tools provide in managing farm operations, including crop and livestock management.

Farm data analysis was another area where digital tools contributed significantly to skill development (mean score = 4.15), suggesting that students feel more confident in analyzing agricultural data and applying it to real-world scenarios.GIS tools (mean score = 4.00) were helpful in improving students' skills in land use assessment and crop management. However, as in previous research questions, GIS tools were considered somewhat less impactful compared to mobile apps and e-learning platforms.

E-learning platforms (mean score = 4.10) provided students with simulated agricultural scenarios, giving them the opportunity to practice real-life applications of agricultural principles.

These findings support the work of Karanja et al. (2019) and Mafini et al. (2022), who reported that digital technologies are crucial in developing practical skills in agriculture, especially in areas like crop management, livestock monitoring, and data analysis.

Conclusion

From the results conclusion indicated that The integration of digital technologies in agricultural education at Rivers State universities has shown significant promise in enhancing both the theoretical knowledge and practical skills of students. The study revealed that e-learning platforms, mobile apps for farm management, and GIS tools positively contribute to students' understanding of agricultural concepts and their ability to apply these concepts in real-world situations. The ability to acquire practical skills through digital tools is crucial for preparing students for the demands of the modern agricultural industry.

However, several challenges remain. The lack of adequate access to digital resources, insufficient faculty training, and poor internet infrastructure continue to hinder the full potential of digital technologies in agricultural education. These barriers are compounded by the high costs associated with acquiring and maintaining digital tools, making it difficult for institutions to provide equitable access for all students.

Despite these challenges, the findings indicate that digital technologies have already made a positive impact on the educational experience of agricultural students. The successful integration of these technologies could transform agricultural education, equipping students with the skills needed for success in an increasingly digital and data-driven agricultural sector.

Recommendations

From the conclusion, the study recommends that

1. **Increase Access to Digital Tools:**

   Universities should prioritize the acquisition of digital resources such as computers, tablets, and specialized software for agricultural education. This could involve collaborations with tech companies, grants, or government programs aimed at improving educational infrastructure.

2. **Enhance Faculty Training and Professional Development:**

   It is critical to provide ongoing training for faculty members to improve their digital literacy and pedagogical skills. Workshops, online courses, and collaboration with ed-tech companies can help educators stay updated with the latest tools and teaching methods in digital agriculture.

3. **Improve Internet Connectivity:**

   Given that internet access is a major barrier, universities should invest in improving campus-wide internet infrastructure, especially in rural or remote areas. Partnering with internet service providers or applying for government funding could help address this issue.

4. **Provide Financial Support for Digital Tool and Curriculum Review Development**

   To address the cost-related challenges, universities could explore partnerships with technology companies to secure discounted or free access to digital tools and platforms. Alternatively, they could create funding opportunities, such as scholarships or subsidies, to help students access these technologies, the curriculum should be continuously updated to integrate emerging digital tools and technologies in agricultural education. Greater emphasis on tools like GIS, data analysis software, and mobile farming apps can help students better prepare for modern agricultural practices.

5. Expand Use of GIS and Other Advanced Digital Technologies to Encourage Collaborative Learning and Peer Support:

GIS tools, while valuable, were not as widely utilized as mobile apps or e-learning platforms. Universities should consider increasing exposure to GIS and similar tools to enhance students' spatial analysis skills, which are vital for modern agricultural practices such as precision farming. And Encouraging students to work together on projects that involve the use of digital tools can enhance their learning experience. Peer learning initiatives could be promoted to help students overcome challenges related to technology and digital literacy.

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Chapter 41

Reimagining Science Education Through Ai and Digital Technologies: Policy Frameworks for Equity, Access, And Sustainable Innovation

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Abstract

The paper proposes a comprehensive set of policy options and strategic interventions, including infrastructural development, curriculum and pedagogical reform, teacher professional development, ethical and regulatory frameworks, sustainable financing, and strategic partnerships. An implementation framework is outlined, detailing the roles of government ministries, educational institutions, teachers, students, private-sector actors, and civil society organizations, along with phased timelines, resource allocation, and monitoring and evaluation mechanisms. The study concludes that AI-driven digital transformation in science education is essential for enhancing quality, inclusiveness, learner engagement, and the development of future-ready scientific skills. Policy recommendations are prioritized into short-, medium-, and long-term actionable goals to ensure the sustainable, ethical, and context-sensitive integration of AI and digital technologies in science education.

Keywords: *Artificial Intelligence, Digital Technologies, Science Education, Educational Equity, Teacher Capacity, Policy Strategies, Infrastructural Development*

1. Introduction

The current state of science education in developing countries, including Nigeria, remains fragile and uneven, reflecting persistent challenges in access, quality, and relevance. National surveys indicate that only 42 percent of secondary schools in

Nigeria have functional science laboratories, and student-to-teacher ratios in science subjects often exceed 50:1 in public schools (Charles-Owaba, 2020a). These conditions are compounded by limited instructional resources, outdated curricula, and a preponderance of teacher-centered pedagogy that restricts opportunities for inquiry, experimentation, and critical thinking. Rural and underserved communities are disproportionately affected, with less than 30 percent of students in these areas having regular access to digital science learning tools or well-equipped classrooms (UNESCO, 2021; World Bank, 2022). Such inequities constrain learning outcomes and undermine science education's capacity to equip learners with the skills needed for participation in a rapidly evolving, knowledge-driven global economy.

Artificial intelligence and digital technologies offer promising avenues to mitigate these structural and pedagogical limitations. AI-powered learning platforms can deliver personalized instruction, adapt content and pace to individual learners' abilities and interests, thereby enhancing engagement and mastery in science subjects. For example, adaptive learning systems deployed in pilot programs across Africa have been shown to improve science test scores by 12-18% compared to traditional classroom instruction (OECD, 2021). Virtual laboratories, simulations, and data analytics platforms provide students with practical, interactive experiences that were previously inaccessible due to inadequate physical infrastructure, allowing learners to conduct experiments, visualize abstract concepts, and engage in authentic scientific inquiry (Holmes et al., 2019). Learning management systems and AI-driven analytics also enhance instructional planning, assessment, and feedback, supporting data-informed decision-making and fostering a shift from passive knowledge transmission to active, learner-centered education.

Beyond classroom improvement, AI and digital transformation in science education align closely with broader national development objectives and strategies for generational empowerment. Science education is a cornerstone for building human capital, fostering innovation, and driving industrial and technological growth. Evidence suggests that students trained in digitally enhanced science programs demonstrate 20 percent higher proficiency in problem-solving and analytical skills required for STEM careers than peers in conventional programs (UNESCO, 2023). Moreover, inclusive digital strategies can reduce entrenched inequalities by expanding access for marginalized groups, including girls, rural learners, and students with disabilities, thereby promoting social equity and economic participation. The integration of AI-driven tools ensures that learners acquire future-ready competencies such as data literacy, computational thinking, and critical decision-making, contributing to national competitiveness and sustainable development.

From a policy standpoint, reimagining science education through AI and digital technologies is both urgent and strategically necessary. Aligning science curriculum

reforms with national digital transformation initiatives ensures coherence across education, technology, and development sectors, creating a foundation for innovation-driven growth. Embedding principles of equity, access, and sustainability in AI adoption not only strengthens educational outcomes but also empowers current and future generations to navigate a digital society responsibly and effectively (Federal Ministry of Education, 2020; Charles-Owaba, 2020b).

Despite the strategic importance of science education for national development, significant inequities persist in access to quality science learning opportunities. Learners from rural, low-income, and marginalized communities continue to experience limited exposure to well-equipped science classrooms, laboratories, and qualified teachers. Gender disparities and socio-economic inequalities further exacerbate unequal participation and achievement in science subjects. These inequities undermine efforts to build inclusive and competitive education systems and limit the potential of science education to serve as a pathway for social mobility and empowerment (UNESCO, 2021; OECD, 2022). Without deliberate policy interventions, existing gaps in the quality and access to science education are likely to widen in the digital era.

The digital divide remains a critical barrier to the effective integration of AI and digital technologies in science education. Many schools operate with inadequate electricity supply, limited internet connectivity, and insufficient access to digital devices. These infrastructural constraints are particularly acute in rural and underserved areas, where connectivity costs and maintenance challenges restrict the adoption of digital learning solutions. As a result, AI-driven tools such as virtual laboratories, adaptive learning platforms, and online science resources remain inaccessible to large segments of the learner population. This uneven access reinforces educational inequality and limits the scalability and sustainability of digital transformation initiatives in science education (World Bank, 2022; ITU, 2023).

Another major challenge is the limited capacity of science teachers and educational institutions to effectively adopt and utilize AI-enabled digital technologies. Many teachers lack the requisite digital and AI literacy skills needed to integrate technology into science pedagogy in meaningful ways. Professional development opportunities related to AI-supported teaching and learning remain insufficient, fragmented, or poorly aligned with classroom realities. At the institutional level, weak leadership, inadequate technical support, and limited organizational readiness further constrain innovation. These capacity gaps reduce the effectiveness of digital investments and contribute to resistance or superficial use of technology in science education delivery (OECD, 2021; Holmes et al., 2019).

In addition to infrastructural and capacity-related challenges, ethical and governance gaps pose serious risks to the responsible adoption of AI in science education. Issues

related to data privacy, security, algorithmic bias, and transparency are often insufficiently addressed within existing education policies and regulatory frameworks. The absence of clear guidelines on the ethical use of learner data and AI-driven decision-making raises concerns about accountability and trust among educators, learners, and parents. Furthermore, limited institutional capacity to monitor and regulate AI applications increases the risk of misuse or unintended negative consequences. Addressing these governance challenges is essential to ensuring that AI integration in science education promotes equity, protects learners' rights, and supports sustainable innovation (UNESCO, 2023; OECD, 2019).

2. Policy Options and Strategic Interventions

2.1 Digital Infrastructure and Access

A fundamental prerequisite for successful integration of AI and digital technologies in science education is the establishment of robust digital infrastructure and equitable access to learning tools. Across many developing countries, including Nigeria, access to reliable electricity and internet connectivity remains a major barrier to the adoption of digital learning solutions. According to the World Bank (2022), only 52 percent of schools in Sub-Saharan Africa have reliable electricity, and less than 40 percent of students have access to the internet at school. In Nigeria specifically, a 2021 survey by the Federal Ministry of Education indicated that approximately 60 percent of secondary schools lacked basic computer laboratories, while over 70 percent of rural schools had minimal or no internet connectivity (Federal Ministry of Education, 2021). These infrastructural deficits severely limit schools' ability to deploy AI-powered learning platforms, virtual laboratories, and interactive digital content, disproportionately affecting learners in rural and underserved communities (UNESCO, 2021).

Connectivity and access to digital devices are not merely logistical concerns; they are directly linked to learning outcomes and student engagement. Schools equipped with functional computer laboratories and stable internet connections report significantly higher student performance in science subjects compared to schools without such infrastructure. For instance, the OECD (2021) found that students in schools with advanced ICT infrastructure scored 15-20% higher on science literacy assessments, highlighting the critical role of technology-enabled learning environments. Policy interventions must therefore prioritize the provision of affordable and reliable internet access, electricity, and sufficient digital devices, including computers, tablets, and AI-compatible platforms, as foundational elements of AI-enabled science education.

The availability of digital tools also affects the pedagogical effectiveness of science teaching. Virtual laboratories, simulations, and AI-supported learning platforms require hardware and software that meet minimum technical specifications. Without

adequate digital resources, teachers cannot implement innovative instructional approaches, and students are deprived of hands-on experiences necessary for developing scientific inquiry skills. Moreover, schools without proper maintenance and technical support are at risk of frequent system failures, which can reduce teacher motivation and disrupt learning continuity (Holmes et al., 2019; World Bank, 2022).

Addressing these infrastructural gaps requires coordinated policy action. Investment in national broadband expansion, renewable and reliable electricity solutions, and provision of cost-effective learning devices should be coupled with clear standards for hardware and software deployment in schools. Public-private partnerships can play a key role in scaling infrastructural solutions while ensuring cost efficiency and sustainability. Strategic prioritization of underserved schools and regions is essential to prevent the exacerbation of existing educational inequalities, thereby enabling AI and digital technologies to serve as tools for inclusive, high-quality science education (UNESCO, 2023; OECD, 2021).

2.2 Curriculum and Pedagogical Transformation

Effective integration of artificial intelligence and digital technologies in science education requires a fundamental transformation of both curriculum content and pedagogical approaches. Traditional curricula, which are often rigid, teacher-centered, and heavily theoretical, limit opportunities for active learning, inquiry, and the development of critical thinking skills. According to UNESCO (2021), less than 35 percent of secondary schools' science curricula in Sub-Saharan Africa include explicit components for digital literacy or computational thinking. This gap constrains learners' ability to engage meaningfully with AI-driven instructional tools, virtual laboratories, and adaptive learning systems. Curriculum reform is therefore critical to align learning objectives with the digital competencies required for participation in the 21st-century knowledge economy.

AI-specific instructional strategies offer opportunities to personalize, interact with, and make science education more inquiry-driven. Adaptive learning platforms, for example, can analyze individual learner performance in real time and adjust content difficulty, sequence, and feedback accordingly. Evidence from the OECD (2021) indicates that schools employing AI-driven adaptive learning systems reported a 12-18% increase in student mastery of complex science concepts compared to traditional instruction. Similarly, virtual laboratories and simulations enable learners to conduct experiments, manipulate variables, and observe outcomes in safe, cost-effective digital environments. Such tools expand access to experiential learning, particularly for students in schools lacking fully equipped physical laboratories (Holmes et al., 2019; World Bank, 2022).

Pedagogical transformation also requires shifting from teacher-centered instruction to learner-centered approaches that emphasize collaboration, problem-solving, and

critical analysis. Project-based learning, data-driven inquiry, and gamified science activities can be integrated with AI tools to increase engagement and conceptual understanding. For example, AI-assisted platforms can guide students through iterative experimentation, prompt reflection on errors, and suggest additional resources tailored to individual learning gaps. In practice, these methods have been shown to improve engagement, with student participation rates in AI-supported science modules rising by 25 percent on average compared to conventional lessons (UNESCO, 2023).

To ensure sustainability, curriculum and pedagogical transformation must be supported by teacher capacity development, continuous content updates, and alignment with national education standards. Curriculum frameworks should explicitly incorporate AI literacy, ethical use of digital technologies, and computational thinking, ensuring that students develop skills necessary for future STEM careers. Policymakers must also establish mechanisms to evaluate curriculum effectiveness and to integrate evidence from AI-driven analytics to refine teaching strategies. Without such systemic reform, digital technologies risk being underutilized or treated as supplementary tools rather than drivers of deep learning and innovation in science education (OECD, 2021; Holmes et al., 2019).

2.3 Teacher Capacity Development

The effectiveness of AI and digital technologies in science education depends heavily on teachers' capacity to integrate these tools into their instructional practice. Evidence suggests that in many developing countries, including Nigeria, a substantial proportion of science teachers lack sufficient digital literacy and AI-related skills to implement technology-enhanced learning effectively. According to UNESCO (2021), fewer than 30 percent of secondary school science teachers in Sub-Saharan Africa have received formal training in integrating educational technology, and fewer than 15 percent report confidence in using AI-based instructional tools. This gap undermines the potential of digital transformation initiatives and reinforces disparities in learning outcomes between schools with well-trained teachers and those without.

AI-specific professional development strategies are therefore central to strengthening teacher capacity. Training programs should equip teachers with skills to use adaptive learning platforms, virtual laboratories, simulations, and learning analytics in lesson planning, instruction, and assessment. For instance, teachers must be able to interpret AI-generated data on student performance, tailor instruction to address learning gaps, and implement feedback mechanisms that support individualized learning. Studies have shown that targeted AI-focused professional development can significantly improve teaching effectiveness; OECD (2021) reports that teachers who completed structured training in AI integration increased student engagement and learning outcomes in science by 10 to 15 percent over one year.

In addition to technical skills, capacity development must address pedagogical adaptation and change management. Teachers need to shift from traditional lecture-based instruction to learner-centered, inquiry-driven approaches that leverage digital tools. Professional development programs should incorporate mentoring, peer collaboration, and communities of practice to encourage the sharing of best practices and problem-solving strategies. Furthermore, training should be continuous rather than one-off, enabling teachers to keep pace with rapidly evolving AI technologies and digital pedagogical tools (Holmes et al., 2019; UNESCO, 2023).

Institutional support mechanisms are also essential for sustaining teachers' capacity development. Schools must provide access to functional digital infrastructure, technical support, and time allocation for professional learning activities. Incentives such as certification, recognition, and career advancement linked to AI competency can motivate teachers to consistently adopt innovative practices. Without adequate institutional backing, even well-designed professional development programs may fail to achieve lasting impact. Thus, a comprehensive strategy for teacher capacity development must integrate skills training, pedagogical support, and institutional frameworks to ensure that AI-enabled science education is delivered effectively, equitably, and sustainably (World Bank, 2022; OECD, 2021).

2.4 Governance, Ethics, and Regulatory Oversight

The adoption of artificial intelligence and digital technologies in science education introduces significant ethical, legal, and governance considerations that must be systematically addressed to ensure responsible and sustainable implementation. AI systems inherently collect, process, and analyze large volumes of student data, including learning patterns, performance metrics, and behavioral information. Without robust governance frameworks, there is a risk of misuse, privacy breaches, and inequitable outcomes, particularly for marginalized learners. UNESCO (2023) reports that in Sub-Saharan Africa, only 25 percent of education systems have established formal guidelines on ethical use of student data or AI technologies, highlighting a critical governance gap.

Policy frameworks must incorporate AI-specific ethical guidelines to safeguard learners' rights and promote equitable access to digital tools. These frameworks should address issues such as data privacy, algorithmic bias, transparency in decision-making, and informed consent. For example, adaptive learning platforms must ensure that recommendations or assessments generated by AI algorithms are interpretable, accurate, and free from discrimination based on gender, socio-economic background, or geographic location. Establishing clear ethical standards encourages accountability and public trust, which are essential for the sustained adoption of AI in education (OECD, 2019; Holmes et al., 2019).

Data protection and security mechanisms are equally critical components of governance. Education authorities must mandate secure storage, encryption, and controlled access to student data to prevent unauthorized use or breaches. Regulatory oversight should require all AI-enabled educational platforms to comply with national and international data protection standards, such as the African Union Convention on Cybersecurity and Personal Data Protection and applicable national data privacy laws. Moreover, monitoring systems must be put in place to detect anomalies or misuse of data in real time, ensuring that students are protected and institutions remain accountable (World Bank, 2022; UNESCO, 2023).

Accountability mechanisms should extend beyond compliance to include systematic evaluation of AI technologies, educational impact and ethical adherence. Independent audits, performance reviews, and reporting requirements can ensure that AI integration aligns with pedagogical goals, national curriculum standards, and equitable objectives. Stakeholder engagement, including input from teachers, students, parents, and civil society organizations, is necessary to ensure transparency and responsiveness in governance processes. A comprehensive regulatory and ethical framework does not only mitigate risks but also strengthens the legitimacy and effectiveness of AI-driven science education initiatives, creating an environment conducive to sustainable innovation and inclusive learning (OECD, 2021; UNESCO, 2023).

2.5 Sustainable Financing and Strategic Partnerships

The large-scale integration of artificial intelligence and digital technologies into science education requires sustained, diversified financing strategies to ensure both equity and long-term viability. Traditional reliance on government budgets alone is insufficient, particularly in resource-constrained contexts were competing priorities limit funding availability. According to the World Bank (2022), education technology initiatives in Sub-Saharan Africa often suffer from short-term, project-based funding, leading to pilot programs that fail to scale or endure. Sustainable financing strategies must therefore combine public investment with innovative funding models, including multi-year budget allocations, education levies, grants, and cost-sharing arrangements, to support infrastructure, teacher training, digital content development, and system maintenance.

Public-private partnerships (PPPs) offer a strategic avenue for leveraging external resources, technical expertise, and innovation in AI-driven science education. Evidence from OECD (2021) and UNESCO (2023) indicates that well-structured PPPs can provide affordable digital devices, cloud-based learning platforms, and AI software solutions while also facilitating capacity-building for teachers and administrators. For instance, collaborations between technology firms and ministries of education in Kenya and South Africa have expanded access to virtual science laboratories and AI-supported learning analytics, improving student engagement and

learning outcomes by 20 percent in participating schools. These partnerships must, however, be governed by clear agreements that protect public interests, ensure equitable access, and prevent dependency on private providers for core educational functions.

Strategic partnerships with research institutions, universities, and international organizations further enhance the quality and sustainability of AI-enabled science education initiatives. Such collaborations can support evidence-based policy design, curriculum innovation, and localized adaptation of AI tools to context-specific learning needs. International development agencies can also provide co-funding, technical support, and monitoring frameworks to ensure accountability and alignment with global best practices in digital education. Integrating these partnerships within a national education technology strategy ensures coherence, reduces duplication of effort, and maximizes the impact of investments (Holmes et al., 2019; OECD, 2021).

Finally, financing strategies must incorporate mechanisms for long-term sustainability and equity. Investments should prioritize underserved and rural schools to prevent widening the digital divide, and funds must be allocated for ongoing system maintenance, teacher professional development, and curriculum updates. By adopting diversified, strategically managed financing models and fostering robust partnerships, policymakers can create an enabling environment for AI and digital technologies to transform science education effectively, inclusively, and sustainably (UNESCO, 2023; World Bank, 2022).

3. Implementation Framework

The successful integration of AI and digital technologies into science education depends not only on well-designed policy options but also on a robust implementation framework that clearly defines roles, sequences of action, and accountability mechanisms. Central to this framework is identifying key stakeholders and their responsibilities. Government agencies, particularly ministries of education and technology, are responsible for policy formulation, regulatory oversight, and infrastructure support. Educational institutions, including schools and universities, play a pivotal role in operationalizing the policies by integrating AI tools into teaching and learning processes and supporting teacher professional development. Teachers serve as frontline implementers, requiring both the capacity and the autonomy to adapt AI-enabled interventions to classroom realities. Students, parents, and community organizations also have a participatory role in ensuring relevance, accessibility, and ethical use of digital technologies. Additionally, private sector partners and technology providers contribute technical expertise, digital resources, and innovation, but their involvement must align with national priorities and ethical standards (UNESCO, 2023; OECD, 2021).

A phased implementation approach is essential to manage the complexity of integrating AI into science education at scale. Rather than attempting simultaneous nationwide deployment, a staged rollout allows for testing, refinement, and adaptation of interventions to diverse contexts. Initial phases should focus on pilot programs in selected schools with varying infrastructural and socio-economic profiles, enabling the assessment of feasibility, effectiveness, and equity implications. Subsequent phases can expand the program geographically while incorporating lessons learned, scaling successful practices, and adjusting strategies to address unforeseen challenges. This phased approach ensures that interventions are evidence-informed, context-sensitive, and capable of sustainable expansion (Holmes et al., 2019; OECD, 2022).

Monitoring and evaluation mechanisms are critical to ensuring accountability, measuring impact, and guiding continuous improvement. A robust evaluation system should include both quantitative and qualitative indicators that capture learning outcomes, teacher and student engagement, technology adoption rates, and equity metrics. Data collected through learning management systems, AI analytics, and institutional reporting channels can inform periodic reviews and policy adjustments. Feedback loops must be established to allow stakeholders at all levels to respond to implementation challenges, including infrastructural deficits, pedagogical gaps, or ethical concerns. Effective monitoring and evaluation not only support evidence-based decision-making but also build public trust and legitimacy in AI-driven interventions, ensuring that digital transformation in science education achieves its intended educational and developmental outcomes (World Bank, 2022; UNESCO, 2021).

4. Conclusion and Recommendations

The integration of artificial intelligence and digital technologies into science education presents both an urgent opportunity and a strategic imperative for national development. This policy paper has highlighted the critical challenges facing science education, including inequities in access, infrastructural constraints, limited teacher capacity, and ethical and governance gaps in AI adoption. It has also articulated clear policy objectives focused on promoting equitable access, strengthening teaching and learning through digital innovation, and ensuring the sustainable and ethical integration of AI technologies. The recommended policy options, including infrastructure investment, curriculum and pedagogical reform, teacher professional development, governance frameworks, and strategic partnerships, are designed to create a coherent and sustainable approach to AI-driven transformation in science education.

Policymakers, education administrators, teachers, and technology partners are called upon to act collaboratively to realize these objectives. Immediate action is required to address inequities in access, enhance teacher capacity, and establish robust

monitoring and evaluation systems. By adopting a phased and evidence-informed approach, stakeholders can ensure that AI and digital technologies serve as tools for inclusive, high-quality science education that prepares learners for future scientific and technological challenges. Ultimately, the successful implementation of these policies will contribute to national development, empower future generations, and position science education as a driver of innovation, equity, and economic growth.

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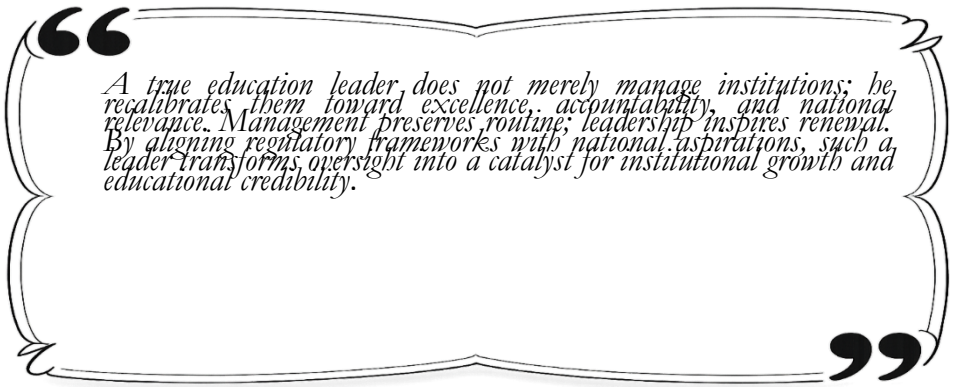
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Chapter 42

Leveraging Artificial Intelligence Technologies for Effective Instructional Delivery of Business Education Courses in Universities in South-South, Nigeria

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Abstract

The study examined the leveraging of artificial intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. Two research questions and two hypotheses guided the study. The study adopted the descriptive survey research design. The population for the study comprised of all 207 Business Educators in 13 public universities across the 6 states in the South-South region of Nigeria. The entire population was used for the study. A structured questionnaire titled "Questionnaire on Leveraging Artificial Intelligence for Effective Delivery of Business Education" (QCLAIEDBE) was used as instrument for data collection. Three experts validated the instrument while test-retest method was used to obtain the reliability coefficient index of 0.88. 197 copies of the questionnaire were retrieved and used for the study. The items were rated on a four (4) point rating scale; mean was used to analyze the research questions and t-test was used in testing the hypotheses. The results revealed a low level of awareness of basis A I technologies and low level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. The researchers recommended that Business Educators should strive for self-development and ensure they are up-to-date with latest technologies and government as well as other stakeholders should ensure training and re-training of Business Educators on the use of evolving technologies to

ensure the leveraging of. Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Keywords: *Artificial Intelligence, Technologies, Leveraging, Business Education, Instructional Delivery.*

Introduction

Education is growing significantly with the introduction of technology, especially the introduction of Artificial Intelligence to teaching and learning. Artificial Intelligence has revolutionized the way teaching and learning takes place, making education more accessible, effective, and efficient. Artificial Intelligence (AI) is a field of computer science concerned with the development of computer systems capable of performing tasks that normally require human intelligence and understanding. Artificial Intelligence refers to the ability of a computer-controlled robot to perform tasks like humans having ability to reason for quality job performance. Benhamou and Janin (2018) opined that Artificial Intelligence involves a collection of technologies that enable machines to act with a very high level of intelligence similar to humans. Accordingly, Bupo and Akpomi (2023) asserted that Artificial intelligence is the replication of human intelligence patterns by computer systems, codes, or machines to act and reason like humans; meaning that computers or machines are made to think like humans and act rationally to solve problems.

Artificial Intelligence is transforming teaching and learning by enabling instructors to adequately plan and deliver lessons. AI tools are also automating administrative tasks for teachers, allowing them to focus more on instruction and mentorship (Zawacki-Richter, et al, 2019). Virtual tutors and intelligent tutoring systems are bridging educational gaps, especially in underserved regions. Geeksforgeek (2024) mentioned that AI tools include Market Research and Trend Analysis, business simulation, conversica, ChatGPT, Grammarly, among others. Across the world, AI technologies such as intelligent tutoring systems, AI powered Learning Management Systems (LMS), virtual classrooms, and automated grading are reshaping instructional delivery.

Instructional delivery involves the process used by educators to transfer knowledge to learners. It involves planning, structuring, and implementing strategies that facilitate effective learning and knowledge retention. Effective instructional delivery ensures that learning objectives are clearly communicated and achieved through engaging teaching strategies. According to Slavin {2018), It requires educators to plan, organize, and present content in ways that actively involve students in the learning process. Instructional delivery through AI technologies enhances knowledge delivery in every educational programme as well as the Business Education.

Business education is a programme of study that provides avenue for the transfer of knowledge and skills to learners for successful participation in the world of business. Business Education is an integral part of vocational and technical education that prepares students for entry into and advancement in Jobs within business and prepares them to own and operate business ventures and function intelligently as consumers and citizens in a business economy (Oguejiofor & Iyoha, 2023). Business Education is designed to fill the gap between knowledge and practice by exposing students to General Education as well as specialized areas in Accounting, Entrepreneurship, Marketing and Office Technology and Management. Business Education contents are all encompassing in which courses contents cuts across areas of Business Management, Business Administration, Office Information Management System, Office Technology and Management, Information and Communication Technology or Information Management System, Purchase/Supply Education. Others are Accountancy Education, Marketing Education, Communication Skills, English Language, Distributive Education, Entrepreneurship Education, Management/Marketing, Education Psychology, Philosophy and Sociology of Education, Business Law, Research Methodology etc, and all these requires exploring the power of Artificial Intelligence (Ukata & Sila-Dikibo, 2020). By leveraging AI technologies, educational institutions can create a more engaging, efficient, and effective learning environment that prepares students for future challenges and opportunities in the business world.

Statement of the Problem

The quest to improve and change the narrative in the education sector requires the application of modern technologies in the teaching and learning process. Artificial Intelligence provides that opportunity for teachers and learners to transfer and gain the required knowledge leveraging on diverse technologies. The major motive of application of Artificial Intelligence is to refine and erect both students' learning and lecturers' service delivery skills as well as ensuring effective learning and teaching process both in the classroom and outside the classroom environment. Leveraging Artificial Intelligence in business education holds great promise for improving learning outcomes and providing students with the required skills to thrive in the constantly evolving business environment.

Notwithstanding the accruable benefits of Artificial Intelligence technologies, there seems to be a notable gap in awareness and utilization of these technologies among Business Educators in universities in South-South, Nigeria. There are concerns regarding educators' familiarity with and utilization of emerging technologies in today's 21st-century academic environment (Edeh, et al. 2020). Amadi-Iwai et al. (2024) asserted that business education lecturers have a low level of awareness that artificial intelligence can be used for improved learning, and to prepare and develop teaching materials for improved job performance. Business educators struggle to

integrate these technologies into their teaching practices (Ukata et al. 2022). Also, Gaber et al. (2023) and Ukeh et al. (2024) revealed that the use of Artificial Intelligence by lecturers is at a relatively low level. This negatively impact students' exposure to and engagement with modern technological tools. Thus, the researchers investigated the leveraging of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Purpose of the Study

The purpose of this study was to examine the leveraging of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. Specifically, the study sought to;

1. determine the level of awareness of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.
2. ascertain the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Research Questions

The following research questions were answered;

1. What is the level of awareness of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria?
2. What is the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria?

Hypotheses

The following null hypotheses were tested;

1. There’s no significant difference in the mean rating of Business Educators in State and Federal universities on the level of awareness of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.
2. There’s no significant difference in the mean rating of Business Educators in State and Federal universities on the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Methodology

The descriptive survey research design was used in conducting the study. The population for the study as indicated in the table below comprised of 207 Business Educators across state and federal universities in South-South, Nigeria.

Table 1: Population Distribution

S/n	Institutions	Total no. Of business educators
	STATE	
1.	Ignatius Ajuru University of Education (IAUE)	25
2.	Rivers State University	33
3.	Niger Delta University (NDU), Yenagoa	7
4.	Delta State University, Abraka	17
5.	University of Delta, Agbor	19
6.	University of Cross River State, Calabar	18
7.	Ambrose Ali University (AAU), Ekpoma, Edo State	8
8.	Akwa Ibom State University, Ikot Akpanden	7
Total		**134**
	Federal	
9.	University of Port Harcourt	6
10.	Federal University, Otuoke (FUOTUOKE)	12
11.	University of Calabar (UNICAL)	25
12.	University of Benin (UNIBEN), Benin City	14
13.	University of Uyo (UNIUYO), Uyo	16
Total		**73**
G/TOTAL		**207**

Source: Institutions Departmental Office, 2025.

The entire population size was used for the study, since the population was small and manageable. Thus, the census sampling technique was adopted for the study. The instrument used for data collection was a structured questionnaire titled titled "Questionnaire on Leveraging Artificial Intelligence for Effective Delivery of Business Education" (QCLAIEDBE). The instrument provided response to the two research questions with 14 items; Items 1-7 addressing Research Question One, items 7-14 addressing Research Question Two in a 4-point rating scale weighted as "High Level" (HL) – 4 points, "Moderate Level" (ML) – 3 points, "Low Level" (LL) – 2 points and "Very Low Level" (VLL) – 1 point. To establish the validity of the instrument, the questionnaire was subjected to face and content validity by one expert from the Department of Business Education, one expert from Department of

Educational Technology and one expert from Measurement and Evaluation, all in the Faculty of Education in Ignatius Ajuru University of Education. To ensure the consistency of the instrument, the test-retest method of reliability was adopted and a reliability coefficient of .88 was established. 197 copies of the questionnaire were retrieved and used for the study; this represents a 95 per cent of the total number distributed. The data analysis was done using the mean to analyze the research questions while t-test was used to test the hypotheses at 0.05 level of significance. The mean was obtained by the summation of all responses as assigned to a rating scale in an item divided by the total number of responses: 4+3+2+1/4 = 2.50. The mean score of 2.50 and above was high, while those below 2.50 were low. Also, the decision rules for the hypotheses were that any hypothesis with a t-calculated value less than the t-critical table value of 1.96 is considered accepted whereas if it is more than the critical table value it is considered rejected.

Results

Research Question 1

What is the level of awareness of artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria?

Table 2: Mean ratings and standard deviation of the respondents on the level of awareness of artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.
N=197

S/N	Items	State (128)		Federal (69)		Mean	Std. Dev.	Remarks
	I'm aware of A I techs such as;	$\overline{X}$	**STD**	$\overline{X}$	**STD**			
1.	Chatbots	1.50	0.91	1.49	0.86	1.50	0.89	VLL
2.	ChatGPT	1.45	0.86	1.42	0.82	1.44	0.84	VLL
3.	Meta A I	1.59	0.94	1.57	1.00	1.58	0.97	VLL
4.	Education CoPilot	1.53	0.91	1.48	0.92	1.51	0.92	VLL
5.	Grammarly	1.43	0.81	1.46	0.86	1.45	0.84	VLL
6.	Google Gemini	1.50	0.91	1.48	0.92	1.49	0.92	VLL
7.	TeachAid	1.43	0.81	1.42	0.82	1.43	0.82	VLL
	Total Mean/SD	**10.43**	**6.15**	**10.32**	**6.20**	**10.40**	**6.20**	
	Grand Mean/SD	**1.49**	**0.88**	**1.47**	**0.89**	**1.49**	**0.89**	**VLL**

Source: Survey Data, 2025

The data presented in table 2 above shows that the responses of the respondents was very low for all the items number 1 - 7 with various mean scores of 1.50, 1.44, 1.58, 1.51, 1.45, 1.49 and 1.43 which indicates a very low level of responses from the respondence regarding awareness of basic A I technologies as Chatbots, ChatGPT, Meta A I, Education CoPilot, Grammarly, Google Gemini and TeachAid. Also, the grand mean of 1.49 and a grand standard deviation of 0.89 indicated that there is a very low awareness level regarding Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Research Question 2

What is the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria?

Table 3: Mean ratings and standard deviation of the respondents on the level of leveraging artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. N=197

S/N	Statements	State (128)		Federal (69)		Mean	Std. Dev.	Remarks
		$\overline{X}$	STD	$\overline{X}$	STD			
8.	I leverage on A I technologies to create teaching materials and content development.	1.55	0.91	1.50	0.86	1.53	0.89	VLL
9.	I leverage on A I technologies to review students' performance and provide feedbacks.	1.45	0.86	1.42	0.82	1.44	0.84	VLL
10.	I leverage on A I technologies to	1.56	0.94	1.55	1.00	1.56	0.97	VLL

	detect plagiarism in course works.							
11.	I leverage on A I technologies to create personalized learning experience for my students.	1.53	0.91	1.48	0.92	1.51	0.92	VLL
12.	I leverage on A I technologies to enhance students' engagement.	1.44	0.81	1.45	0.86	1.45	0.84	VLL
13.	I leverage on A I technologies for preparation of lesson notes.	1.49	0.91	1.47	0.92	1.48	0.92	VLL
14.	I leverage on A I technologies to provide answers to complex questions.	1.50	0.81	1.55	0.82	1.53	0.82	VLL
	Total Mean/SD	**10.52**	**6.15**	**10.42**	**6.20**	**10.50**	**6.20**	
	Grand Mean/SD	**1.50**	**0.88**	**1.49**	**0.89**	**1.50**	**0.89**	**VLL**

Source: Survey Data, 2025

The data presented in table 3 shows that the responses of the respondents was very low for all the items number 8 – 14 with various mean scores of 1.53, 1.44, 1.56, 1.51, 1.45, 1.48 and 1.53 which indicates a very low level of responses from the respondents regarding leveraging of A I technologies in creating teaching materials and content development, reviewing students' performance and provide feedbacks. detecting plagiarism in course works, creating personalized learning experience for my students, enhance students' engagement, preparation of lesson notes and provide answers to complex questions. Also, the grand mean of 1.49 and a grand standard deviation of 0.89 indicated that there is a very low level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Hypotheses 1

There's no significant difference in the mean rating of Business Educators in State and Federal universities on the level of awareness of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Table 4: T-test result on level of awareness of artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Respondents	N	Mean	Std. Dev.	Df	T-Cal Value	T- Crit Value	L/Sig	Decision
State	128	1.49	0.88					
				195	0.15	1.98	0.05	Accepted
Federal	69	1.47	0.89					

Source: Survey Data, 2025.

Table 4 above revealed a t-calculated value of 0.15 which is less than the standard t-critical value of 1.98; thus, the null hypothesis was accepted. The result therefore is that there is no significant difference in the mean rating of Business Educators in State and Federal universities on the level of awareness of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Hypotheses 2

There's no significant difference in the mean rating of Business Educators in State and Federal universities on the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Table 5: T-test result on level of leveraging artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Respondents	N	Mean	Std. Dev.	Df	T-Cal Value	T- Crit Value	L/Sig	Decision

State	128	1.50	0.88					
				195	0.08	1.98	0.05	Accepted
Federal	69	1.49	0.89					

Source: Survey Data, 2025.

Table 5 above revealed a t-calculated value of 0.08 which is less than the standard t-critical value of 1.98; thus, the null hypothesis was accepted. The result therefore is that there is no significant difference in the mean rating of Business Educators in State and Federal universities on the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Discussion of Findings

One of the findings of this study showed that all items were rated very low, which indicated a very low level of awareness of basic A I technologies as Chatbots, ChatGPT, Meta A I, Education CoPilot, Grammarly, Google Gemini and TeachAid. This indicated that there is a very low awareness level regarding Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. This finding agrees with Edeh, et al. (2020) who revealed that there are concerns regarding educators' familiarity with and utilization of emerging technologies in today's 21st-century academic environment. The finding also aligns with Amadi-Iwai et al. (2024) who asserted that business education lecturers have a low level of awareness that artificial intelligence can be used for improved learning, and to prepare and develop teaching materials for improved job performance.

Result on hypothesis one proved that that there is no significant difference in the mean rating of Business Educators in State and Federal universities on the awareness level of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. This indicated that Business Educators in both State and Federal universities are poorly aware of Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Also, the findings of this study relating to leveraging Artificial Intelligence for effective instructional delivery showed that all items were rated very low, which indicated a very low level of leveraging of A I technologies in creating teaching materials and content development, reviewing students' performance and provide feedbacks. detecting plagiarism in course works, creating personalized learning experience for my students, enhance students' engagement, preparation of lesson

notes and provide answers to complex questions. This indicated that there is a very low level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. This finding agrees with Ukata et al. (2022) that asserted that Business educators struggle to integrate these technologies into their teaching practices. It also aligns with Gaber et al. (2023) and Ukeh et al. (2024) who revealed that the use of Artificial Intelligence by lecturers is at a relatively low level.

Result on hypothesis two proved that that there is no significant difference in the mean rating of Business Educators in State and Federal universities on the level of leveraging Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria. This indicated that Business Educators in both State and Federal universities are rarely leverage on Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Conclusion

Artificial intelligence is the replication of human intelligence patterns by computer systems, codes, or machines which acts and reasons like humans rationally to solve problems. The application of Artificial Intelligence is vital and has changed the trajectory of educational delivery; improving the teaching and learning process. However, the study revealed that Business Educators are poorly aware basic A I technologies as Chatbots, ChatGPT, Meta A I, Education CoPilot, Grammarly, Google Gemini and TeachAid and they rarely leverage on Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

Recommendations

Based on the findings of this study, the following recommendations were made;

1. Business Educators should strive for personal development and ensure they are up-to-date with latest technologies that would help for effective delivery of Business Education courses in universities in South-South, Nigeria.
2. Government and all other stakeholders must ensure training and re-training of Business Educators on the use of evolving technologies to ensure the leveraging of. Artificial Intelligence technologies for effective instructional delivery of Business Education courses in universities in South-South, Nigeria.

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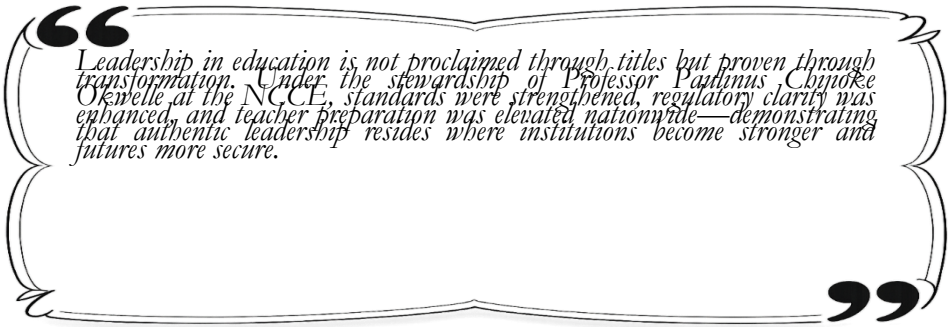
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Chapter 43

Leveraging Pedagogical Strategies for Enhancing Smart Education Acquisition by Pre-Service Business Education Students in Nigerian Universities

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Abstract

Teaching and learning in a technologically driven world are largely a function of smart education. Smart education fosters a smart learner generation by immersing students in intelligent pedagogies enabled by smart settings and technology breakthroughs. The goal is to create digital natives who can contribute to the growth and development of the digital economy. Promoting the acquisition of smart education among business education students in Nigerian universities will undoubtedly provide them with digital literacy and position them to join the rest of the world in the march towards digitalization. This could be accomplished using a variety of technology-enabled educational tools.

Keywords: *Pedagogical Strategies, Smart Education Acquisition Pre-Service Business Education Students*

Introduction

In today's rapidly changing educational scene, the emphasis is evolving towards technological tools in order to provide students with the skills and information they need to flourish in the twenty-first century. This is because learning technology development has impacted not just modern-day capacities, yet additionally instructional assets and institutional limits (Haleem *et al.*,2022). Both teachers and students are hardly constrained by educational boundaries because of technological

advancements that have enabled remote and blended education, providing participants with increased freedom, a diverse choice of courses, flexibility, and inexpensive possibilities. Virtual and mixed instruction can provide access to worldwide education groups, allowing students to connect and acquire a global attitude. More specifically, in the fourth wave of industrialization, also known as Industry 4.0, the rise of automation and the progressively overlapping lines among machines and people are projected to provide a competent and professionally trained population (Azmi *et al.,* 2018; Lase, 2029). Students must develop complete competencies, encompassing both technical and general abilities, which cannot be obtained solely through textbooks and instruction (Azmi *et al.,* 2018). As a result, developing a smart education system is crucial to provide students with the option of selecting the most beneficial educational route for themselves.

Smart Education, frequently referred to as digital schooling, technology-enhanced learning, is the use of technological and electronic devices in the course of instruction with the goal of improving outcomes for learning. It refers to an extensive variety of academic strategies that use technologies to provide more interesting, immersive, as well as effective educational opportunities. Smart education frequently includes making use of electronic texts, virtual classes, and interactive content. These resources are available on a variety of gadgets, including smartphones, tablets, and desktops (Agarwal, 2023a). Technologies enable learners to engage via tasks such as tests, games, and online laboratories. These technologies can make education more entertaining and assist learners in comprehending difficult topics. Smart education encourages collaboration between students and professors via web-based forums, video calls, and cooperative paper processing. This can help with collaborative tasks and learning among peers. Learning technologies could offer significant data on learning outcomes, assisting educators in identifying areas where learners may be suffering and enabling more focused responses. In a flipped learning environment, pupils watch educational films or read books privately before engaging in active conversations and tasks in the school setting. Technologies can help to make this strategy more effective.

Smart education promotes blended and distance learning methods, allowing learners to learn from home or in a mix of both that combines live and virtual instruction. Augmentation and virtual reality (VR) technology can be utilized to improve learner engagement and immersion (Aggarwal, 2018b). Interactive aspects, such as prizes and competitions, can inspire pupils, whilst VR may offer immersive experiences for a variety of courses. Artificial intelligence (AI) can be utilized to develop intelligent systems for teaching which offer tailored input and other assistance to learners. It can also help to automate office duties, freeing up instructors' time to educate. Intelligent schooling may render instruction easier for learners who are disabled by including capabilities such as visual aids, speech recognition, and closed captions. Smart education seeks to use innovation to render education better, more affordable, and

interesting, while adapting to the requirements and tastes of varied individuals in modern times. It is constantly evolving in response to technological advancements, and its influence on schooling is enormous and widespread.

The argument for supporting Smart Education in Business Education in Nigerian universities is that it has provided several benefits to learners as well as instructors. Smart schooling renders education more dynamic and enjoyable, resulting in increased retention and grasp of material. With electronic educational materials and e-books, learners are given quick access to an array of materials, enabling individuals to delve deeper into themes. Courses delivered online allow participants to acquire knowledge at their own discretion and comfort (Aggarwal, 2017c). Digital tools, such as movies and online exercises, improve comprehension by offering sensory and interactive ways to learn. Furthermore, having access to teaching resources on tablets, laptops, and cellphones allows students to learn at any time and from any location.

As innovation in technology advances, the opportunities for smart teaching grow exponentially. Both educators and learners may look ahead to using virtual and augmented reality technologies in educational settings to give realistic learning opportunities. Intelligent machines and automated learning technology may additionally customise the educational experience by catering to every learner's unique desires and requirements. Smart education encourages interaction and cooperation between learners and their instructors. Digital applications and instruments allow learners to collaborate on assignments, communicate thoughts, and get input from classmates and teachers.

Additionally, smart schooling enables immediate evaluation and response. Instructors may instantaneously monitor the growth of learners and achievement, allowing for immediate corrections and encouragement. Technology can help teachers simplify office tasks like scoring and documentation, enabling them to concentrate on education and assisting learners (Aggarwal, 2021d). Although there may be start-up costs in technological facilities and applications, intelligent instruction can be affordable in the years to come since it eliminates the demand for tangible resources such as textbooks and saves money on travel for remote students. Innovative schooling can improve worldwide interaction and cooperation between learners and instructors from all over the globe, resulting in a broader and more equitable learning atmosphere (Aggarwal, 2023e). Web-based tools facilitate the sharing of academic information, plans for lessons, and efficient methods among teachers, thereby encouraging teamwork and continuing education. Switching to electronic materials can help with environmentally friendly initiatives by minimizing demand for stationery and lowering the carbon footprint related to conventional schooling.

In constantly shifting industries, intelligent instruction can swiftly adjust to absorb new advances in technology, guaranteeing learners obtain the most current information and abilities. Digital schooling is transforming the conventional learning environment. It provides limitless opportunities for kids to interact with content, discover new ideas, and build vital abilities for today's modern world. The incorporation of electronic devices makes schooling livelier and more individualized, giving participants a transforming educational encounter. Learners can access a plethora of knowledge and possibilities for cooperation by utilizing electronic devices as well as internet channels. The combination of both augmented and virtual reality can improve education by providing realistic and engaging settings (Beard, 2020). Furthermore, artificial intelligence and machine learning technologies can adjust to each learner's specific needs, guaranteeing that they receive focused assistance and individualized training. Finally, intelligent instruction enables individuals to grow as forever learners and equips them for advancement in an environment that is increasingly digital.

Factors contributing to a complete smart education system

This intelligent schooling model is one of the most productive and intriguing approaches to advancing learning. The goal of cutting-edge schooling is to develop an innovative student population by engaging students in smart methodologies enabled by smart settings and technology advancements (Zhu *et al.*, 2016). A comprehensive, clever school system consists of three main components: smart learners, smart pedagogies, and smart settings.

1. Smart learners

Intelligent Students are those who grasp the understanding and abilities of the twenty-first century to face the difficulties and necessities of daily life and career in the age of technology. savvy students must additionally have long-term technical abilities, but also the appropriate soft abilities, which include both private competencies and interpersonal abilities (Nafea & Toplu,2021). They must actively seek out information and educational methodologies that are suitable for them (Ibrahim & Ani, 2017) and develop their own knowledge and abilities through interactions with fellow students, tutors, technology breakthroughs, and instructional materials (Asoodar *et al.*, 2016). Attaining success in an intelligent educational setting can be challenging and relies largely on students' educational traits such as teamwork, determination, perseverance, hunger for knowledge, and taking chances, as well as controlling their time, productive studying, innovative thinking, and collaborative education. To satisfy the demands of the intelligent system of education, students must possess the four competencies listed below (Zhu *et al.*, 2016):

(1) Core information and fundamental abilities serve as a basis for improvement in abilities and setting targets, which aids in gaining an awareness of topics (Madhusudhana, 2018).
(2) Reading understanding, including thinking strategically and resolving issues.
(3) Individualised experience that encourages students to think critically and provide fresh thoughts while pursuing education and employment as contributors to innovations.
(4) The term collective intelligence describes a group of people's ability to collaborate and combine their expertise and skills to complete duties or solve issues. This group's knowledge can be developed by collecting, organizing, and improving one's own material, then fostering interaction and teamwork among students (Le *et al.,* 2019).

2. Smart pedagogies

Pedagogy can be described as an academic discipline that is continually growing and seeking new ways to instruct and involve students in the course of knowledge acquisition. SMART stands for Self-Monitoring, Analysis, and Reporting Technology. In modern culture, when innovation is interwoven into the curriculum, smart means intelligent gadgets (Zhang & Long, 2021). According to Zhu et al. (2016), if the purpose of schooling is for students, then technologies serve as a supportive element impacting the educational atmosphere for innovative instructional methods which concentrate on savvy students. An intelligent methodology is thus a collection of fresh instructional tactics, techniques, and procedures that give intelligent characteristics such as adaptability, perception, inference, self-education, anticipation, and adaptive optimization for educational procedures, objects, and environments (Uscov, 2022). The impact of innovative approaches created with a student-centred perspective has influenced students from every culture, educational stage, and hobby to improve their understanding abilities (Zhu et al., 2016). A rapidly changing and savvy society necessitates that the workers of the future demonstrate complete abilities such as sound reasoning and choice-making, assessment and ability to negotiate, managerial and supervisory qualities, and personal and advanced abilities to communicate, all of which can be developed through instruction and problem-based educational methods. Students ought to be proficient in using efficient methods of learning, such as actively utilizing concepts from theory in application, engaging in lively debate, understanding issues from various viewpoints, and receiving instruction from experienced individuals; additionally, inside multidisciplinary teams, through collaboration and application, they acquire the interpersonal abilities required for teamwork and interaction when performing routine duties. likewise, each student, regardless of previous experience, training or area of aptitude, needs an appropriate and adaptable curriculum that sparks their enthusiasm and encourages their knowledge. As a result, this paper

contends that collaborative learning and mentorship are two of the most significant pedagogic tools for allowing learners to widen their perspectives and achieve full understanding.

3. Smart learning environment

Intelligent educational settings are a new trend among schools that use technologies to boost, strengthen, and drastically alter the educational processes. Both hardware and software technological assistance, as well as online assets, all contribute to the creation of intelligent environments. There exists no universally accepted definition for intelligent educational settings, although various conceptual structures provide explanations for their core properties. Smart educational settings, for example, have an outstanding capacity to respond to each student's requirements and various educational situations by altering the order of assignments, complexity, duration, kind of input, and instructional pace. Intelligent educational settings provide tailored instruction for every student based on their targets, requirements, and preferences. Clever instructional settings give enhanced instructional guidance by analyzing a student's position and their actual surroundings, and then delivering current and pertinent support. The idea of an intelligent educational atmosphere is being extensively utilized [Temdee, 2014] to meet the growing need for educational flexibility. An intelligent atmosphere for education is one that dynamically encourages productive education among students. Being clever can be used in both offline and digital educational contexts. The main goal is to make the atmosphere intelligent. Huang et al. (Tinoco-Giraldo, 2020) stated that the goal of an intelligent educational setting is to allow easy, active, and successful studying. As a result, an intelligent educational setting must be designed in both scientific and pedagogic aspects. It could be broadened in terms of time, location, technology-based conversation, and management (Nafea & Toplu, 2021) to help and engage students in a continuous method of learning that allows them to accomplish tasks effortlessly and organically. Technologies include both hardware and software. Hardware refers to tangible technical devices like IQ boards, projector panels, and interactive LED display screens that use cloud-based computing, connected devices, IoT technologies, and intelligent multimedia technologies. Education devices, internet resources, new virtual reality-based support apps, and educational statistics are all examples of applications. From an instructional point of view, an educational setting is set up to help instructors in successfully creating and carrying out classes and educational activities, as well as to support learners in improving their abilities and expertise through greater adaptability and variety in instructional techniques (Lase, 2019).

Numerous studies have discovered that an intelligent educational atmosphere has significantly altered how students and enablers relate to one another, allowing for cooperation in an adaptable setting (Cho & Lim, 2017). Training procedures continue

to be implemented, including group formation, tracking of advancement, and curriculum adjustments to meet the demands of the learners. An intelligent educational setting helps students establish the correct groups by connecting them with appropriate collaborators from a variety of academic groups. Students have the opportunity to take part in online educational settings where they can study both autonomously and simultaneously, use common libraries with diverse and quality materials, and collaborate in shared educational environments. Education progression is tracked and assessed to discover each student's strengths and shortcomings, as well as areas for growth in the course of study. Intelligent schooling is emerging as an exciting possibility for developing a fresh crop of savvy workers who must be prepared with essential skills such as long-term expertise and adaptability. Innovative approaches are intended to zero in on educating students, resulting in an educational atmosphere that is adaptable, diversified, and smartly aided by technology and innovative devices (Zhu *et al.*, 2016). As the educational paradigm evolves, teachers frequently acknowledge the importance of using groundbreaking teaching methods to address the different requirements of unskilled learners and equip them for advancement in an ever-shifting world (Leather & Stockham, 2016).

Conventional methods of instruction are widely defined by a teacher-centred strategy in which the teacher serves as the principal content transmitter while learners merely collect knowledge (Bature, 2020; Loreman, 2017). This strategy frequently employs memorizing facts by heart, testing by standardized criteria, and an all-encompassing syllabus, which can hinder pupils' crucial, imaginative, and analytical skills. Modern instructional practices, on the other hand, emphasize student-centred understanding, active involvement, and the acquisition of 21st-century skills, as well as critical thinking, cooperation, verbal interaction, and inventiveness (Chan, 2023; Dimaano, 2021). These approaches are founded on constructivist theories of knowledge acquisition, which state that learners build their comprehension of the industry via active engagement and inquiry-driven evaluation. Teachers may develop lively and appealing instructional settings that enable learners to achieve success in an ever more complicated and connected global society by adopting modern instructional techniques that prioritize student-centred learning, inquiry-driven approaches, teamwork, integrating technology, and actual assessment. As a consequence, two methods of instruction, collaborative learning and online mentoring, are regarded as excellent ways to learn for students who must adapt to evolving demands.

1. Collaborative learning

In an intelligent educational setting, educators must build adaptable instructional tactics, improve the quality of instructional material, and assess the influence of the educational experience on outcomes for students in order to inspire students to engage with learning proactively (Kallel & Chniter, 2019). As a result, collaborative

learning has emerged as one of the most successful instructional methods for designing an intelligent educational atmosphere. Lecture information is an important foundation of core understanding and basic skills for students in their educational process. However, in college and university to acquire core information, improve sophisticated understanding capacities and, most importantly, take part in adaptable solving problems, learners must venture outside of their familiar environments by actively sharing expertise and abilities and learning with other students. Cooperative education is a method of learning in which students are urged to investigate and collaborate in groups to complete assignments and accomplish common objectives. According to Scager *et al.* (2016), this type of study allo1. ws students to cultivate both intellectual abilities, such as analytical abilities, abilities to conduct research, innovative problem-solving, and choice-making, as well as pro-social behaviours such as comprehending, interacting, bargaining, assisting, distributing, and working together. Furthermore, learners who study in groups have a considerably deeper comprehension than individuals who learn separately. In a collaborative education setting, students participate in superior interactions with others, such as debating contradicting material, clarifying and challenging one another critically, detecting misunderstandings, and building links between new and earlier acquired knowledge. Furthermore, it is a good method for moderators to identify a low-performing learner and help them discover a way to increase their academic effectiveness and level of involvement.

Working together to learn promotes students improve their skills by sharing their expertise and knowledge with their peers (Scager *et al.,* 2016). The model allows learners to form their own groups with common aims or to find an existing group with similar purposes (Jeong & Hmelo-Silver, 2026). They participate in the educational process by sharing resources, acquiring new concepts, discussing and addressing ambiguous theories, and collectively constructing ideas, particularly when learners are in different locations (Scager *et al.,* 2016). Furthermore, cooperative educational applications allow them to learn both synchronously and asynchronously, using a variety of media and platforms. Working together among students with various backgrounds and personality traits, as well as various areas of expertise, allows students to gain new understanding and develop sophisticated abilities such as strong critical thinking and ability to negotiate, wise behavioral intelligence, and strong interpersonal abilities, all of which contribute to the development of a more powerful community of learners (Zhu *et al.,* 2016).

2. E-mentoring

Another productive educational approach that enables students to study under mentors who are professionals in their industry and have distinct expertise and abilities is E-mentoring. E-mentoring occurs when both mentors and students want to grow together (Aderibigbe, 2014). This technique comprises a tutor-mentee

relationship and an educational procedure with adaptable courses. Engaging with professional organisations enables students to connect with relevant coaches who can guide them, generate ideas, provide expertise, and support their academic advancement. Mentors with relevant experience, knowledge, and abilities can create appropriate courses and activities that can be adapted as the student advances. As a result, students over time acquire the skills necessary to deal with complicated issues and make choices.

Mentorship is a crucial aspect of teacher preparation, with a substantial impact on the personal growth of novice teachers as they progress into career instructors. Learners obtain academic understanding as well as instructional abilities in teacher training programs, but mentorship helps them overcome the gap between theory and actual-life classroom application. Seasoned mentors offer assistance, support, and constructive feedback to inexperienced instructors as they traverse the difficulties of teaching, such as classroom organization and student participation (Ben-Amram & Davidovitch,2024). Mentorship is especially significant in terms of educator retention. Many new teachers quit the profession early, particularly in difficult school situations, due to insufficient encouragement. Organized mentoring initiatives address this issue by creating an atmosphere of encouragement that increases trust as well as ability. Furthermore, mentorship promotes reflective instruction, enabling mentees to identify their own abilities and opportunities for growth, ultimately improving instructional efficiency and outcomes for learners (Zamiri & Esmaeili, 2024). Mentorship in teacher training is typically defined as a technology-enabled academic partnership in which a seasoned instructor helps a rookie teacher develop. This relationship might be informal, such as collegial advice, or explicitly organized via organizational initiatives.

E-mentoring has long been recognised as an essential component of transdisciplinary teacher development and progression. E-mentoring, also known as digital mentorship, is a collaborative relationship between a seasoned professional (mentor) and someone who is less seasoned (mentee) that is intended to assist personal growth, career success, and advancement of skills (Usanmaz, 2025). It is a teaching and learning opportunity for both the mentor and the mentee, and it has the potential to improve both participants' careers and personal fulfilment. They engage in learning partnerships that promote growth, reflection, and skill development. Unlike the old apprenticeship paradigm, modern mentoring emphasises two-way communication, trust, and reciprocal learning. For those being mentored, effective interactions with mentors lead to proactive career preparation, career progression and/or promotion, increased job satisfaction, greater drive to continue in academics, and personal growth and development. Mentoring improves both mentees and mentors, as reported by Evans *et al.* (2020) and Wettemann (2021).

From the viewpoint of the institution, effective relationships with mentors result in greater involvement and job fulfilment, better hiring and keeping of multidisciplinary faculty, firmer belief in the organisation's dedication to its faculty, publication success, increased grant acquisition rates, and profitable promotion/career development. To be clear, the word mentoring employed in this publication refers to a process that has a functional objective (Crites *et al.,* 2022), but is intrinsically flexible and can take several forms and functions. Mentoring can also be defined as a complex connection built on shared professional and personal interests. Mentoring can be distinguished from sponsoring, supervising/precepting, onboarding, research advising, counselling, or consulting (Crites *et al.*, 2022; Ward *et al.*, 2020). An individual can take on all or part of these roles at different times. In its most basic form, a mentor examines strategic career development in a supportive environment that promotes mentee advancement while also providing mentor satisfaction and a sense of fulfilment (Crites *et al.*, 2022).

Conclusion

Finally, expanding pedagogical strategies for 21st-century competences and high-quality instruction are critical for success in the workplace and beyond. By embracing these tactics and sharing our ideas, we may catalyze a radical educational shift that will enable kids to succeed in an increasingly complex and linked global context. As we continue to refine and expand on those pedagogical approaches, we must remain committed to attaining excellence in education while ensuring acceptable transactions for generations to come. The importance of our effort extends far beyond our classrooms and educational institutions. We find ourselves most successful in providing learners with the competencies they need to thrive in today's world and training them to be engaged members of society when we use new pedagogical strategies. It is critical to recognize that our actions as teachers have a ripple effect, influencing the development of those around us and around the globe. One area that requires greater exploration is the impact of these teaching strategies on pupils from various socioeconomic and cultural backgrounds. Understanding how these strategies can be tailored to meet the individual requirements of learners is critical to ensuring fair access to high-quality instruction.

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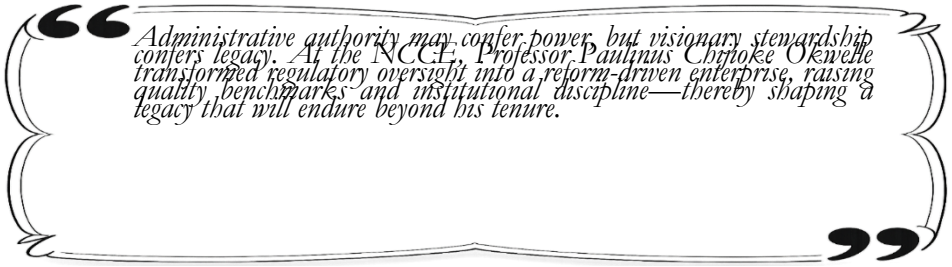
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Chapter 44

Evaluating The Use of Learning Analytics to Enhance Educational Practices in Computer Science: A Study of Tertiary Education Student Performance

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Abstract

This study investigated the effective utilization of learning analytics to enhance educational practices and improve student performance within the Computer Science and Computer Education departments at selected Nigerian tertiary institutions. The primary objectives include assessing the current state of learning analytics tools used in these departments and analyzing their impact on student academic performance. The research is guided by four questions focusing on the tools employed, their effects on performance, educators' perceptions, and the challenges faced in implementation. A survey design was employed, targeting a population of lecturers across four institutions: FCET Akoka, YABATEC, UNILAG, and UNIBEN. A sample size of 160 participants was chosen using purposive, convenience, and stratified random sampling techniques. Data were collected through a structured questionnaire consisting of 26 items, which underwent validation and reliability testing, achieving a coefficient of 0.808. The questionnaire was administered both online and in person, with 124 completed responses analyzed using descriptive statistics and regression analyses. The findings revealed a significant positive relationship between the use of learning analytics and student academic performance, with educators' perceptions varying based on their experience. Major conclusions drawn indicate the necessity for enhanced training programs to optimize the use of learning analytics. Recommendations include developing comprehensive training initiatives, increasing access to learning analytics tools, and

fostering a supportive environment to effectively implement these strategies, ultimately leading to improved educational outcomes.

Keywords: *Learning Analytics, Educational Practices, Student Performance, Educators' Perceptions, and Tertiary Institutions*

Background of the Study

The integration of learning analytics into educational practices has emerged as a significant trend in higher education, particularly in fields such as computer science. Learning analytics involves the systematic analysis of student data to enhance learning outcomes and improve instructional methods (Siemens, 2013). As educational institutions increasingly adopt technology in their curricula, the potential of learning analytics to inform teaching practices and foster student success becomes paramount. This study evaluates the use of learning analytics to enhance educational practices in computer science, focusing on students and teaching staff from the Computer Education and Computer Science departments at four Nigerian tertiary institutions: Federal College of Education (Technical) Akoka (FCET Akoka), Yaba College of Technology (YABATEC), University of Lagos (UNILAG), and University of Benin (UNIBEN).

In the context of computer science education, learning analytics can provide valuable insights into student engagement, performance, and learning behavior. These insights allow educators to tailor their teaching strategies to meet the diverse needs of learners, thereby facilitating personalized learning experiences (Ferguson, 2017). The effective use of learning analytics has the potential to identify at-risk students early in their academic journey, enabling timely interventions that can improve retention and success rates (Papamitsiou & Economides, 2014). This study seeks to explore how these analytics are utilized within the selected institutions to enhance educational practices.

FCET Akoka, YABATEC, UNILAG, and UNIBEN are recognized for their comprehensive programs in Computer Science and Computer Education. Each institution has developed distinct educational approaches that can benefit from the insights provided by learning analytics. For instance, UNILAG has integrated innovative teaching methods and technology into its curriculum, while YABATEC emphasizes hands-on, practical skills in its training programs (Ogunleye, 2019). Understanding how learning analytics can enhance these practices is crucial for ensuring that graduates are well-prepared for the demands of the technology industry.

The population for this study includes students and teaching staff from the Computer Science and Computer Education departments at the four institutions. Engaging both

students and educators in the research allows for a comprehensive examination of the impact of learning analytics on educational practices. Students' perspectives can provide insights into how analytics influence their learning experiences, while educators can share how data informs their instructional decisions and curriculum design (Dawson et al., 2018).

Implementing learning analytics in higher education also poses challenges that must be addressed. Factors such as data privacy concerns, the need for technical infrastructure, and the necessity for training educators in data interpretation can impede the effective use of learning analytics (Ifenthaler & Yau, 2020). This study aims to identify these challenges and explore strategies for overcoming them, thereby maximizing the benefits of learning analytics in the selected institutions.

Moreover, the use of learning analytics can foster a culture of data-informed decision-making among educators. By analyzing trends and patterns in student performance, faculty can make evidence-based adjustments to their teaching methods and curricula. This approach not only enhances individual student outcomes but also contributes to the overall improvement of educational quality within institutions (Baker & Inventado, 2014). The findings from this study will provide insights into how learning analytics can be effectively integrated into computer science education.

In addition to its potential benefits, the implementation of learning analytics also raises ethical considerations, particularly concerning data privacy and security. Institutions must ensure that the data collected is used responsibly and that students' privacy is protected (Hawkins et al., 2017). Understanding these ethical implications is crucial for developing a framework that balances the advantages of learning analytics with the need for responsible data use.

The study will also explore the perceptions of teaching staff regarding the effectiveness of learning analytics in enhancing educational practices. Faculty feedback is essential for understanding the practical implications of data-driven approaches and for fostering a collaborative environment where educators can share best practices and insights (Dawson et al., 2018). This collaboration can lead to a more cohesive implementation of learning analytics across departments.

In conclusion, this study aims to evaluate the use of learning analytics to enhance educational practices in computer science at FCET Akoka, YABATEC, UNILAG, and UNIBEN. By examining the experiences of both students and educators, the research will contribute to a deeper understanding of how learning analytics can be leveraged to improve teaching and learning outcomes. The insights gained from this study will not only benefit the participating institutions but also provide a framework for other tertiary institutions seeking to implement learning analytics effectively.

Statement of the Problem

In recent years, the integration of learning analytics in educational practices has become increasingly relevant, yet many tertiary institutions in Nigeria, particularly those offering Computer Science and Computer Education programs, have struggled to effectively implement these tools. This gap has resulted in suboptimal educational outcomes, as educators often lack the insights needed to tailor their teaching approaches to diverse student needs. Furthermore, there is limited empirical evidence on the impact of learning analytics on student performance and engagement in these fields, which hinders the development of data-driven educational strategies. This study aims to evaluate the use of learning analytics to enhance educational practices in computer science at selected institutions, including FCET Akoka, YABATEC, UNILAG, and UNIBEN.

Purpose of the Study

The purpose of this study is to evaluate how learning analytics can be effectively utilized to improve educational practices and enhance student performance in the Computer Science and Computer Education departments at selected Nigerian tertiary institutions.

Research Objectives

1. To assess the current state of learning analytics tools used in the Computer Science and Computer Education departments at the selected institutions.
2. To analyze the impact of learning analytics on student academic performance in computer science courses.
3. To explore the perceptions of educators regarding the effectiveness of learning analytics in informing their teaching practices.
4. To identify the challenges faced by educators in implementing learning analytics in their instructional methods.

Research Questions

1. What are the current learning analytics tools utilized in the Computer Science and Computer Education departments at the selected institutions?
2. How does the use of learning analytics affect student academic performance in computer science courses?
3. What are educators' perceptions of the effectiveness of learning analytics in shaping their teaching practices?
4. What challenges do educators encounter when implementing learning analytics in their instructional methods?

Null Hypotheses

H_{01}: There is no significant relationship between the use of learning analytics and student academic performance in computer science courses at the selected institutions.

H_{02}: Educators' perceptions of the effectiveness of learning analytics do not significantly differ based on their experience in implementing these tools in their teaching practices.

Research Design

The study employed a survey design to gather quantitative and qualitative data from students and teaching staff in the Computer Science and Computer Education departments at FCET Akoka, YABATEC, UNILAG, and UNIBEN. This design was deemed appropriate because it allowed for the efficient collection of a large volume of data regarding the use of learning analytics and its impact on educational practices across multiple institutions. By utilizing structured questionnaires, the researchers could capture participants' perceptions, experiences, and the effectiveness of learning analytics tools. The survey design facilitated a comprehensive analysis of trends and correlations, enabling the researchers to draw meaningful conclusions about the relationship between learning analytics and student performance. Additionally, the anonymity of survey responses encouraged honest feedback, thus enhancing the validity of the findings.

Population, Sample, and Sampling Technique

The population for this study consisted of lecturers from the Computer Science and Computer Education departments at four selected tertiary institutions in Lagos: Federal College of Education (Technical) Akoka (FCET Akoka), Yaba College of Technology (YABATEC), University of Lagos (UNILAG), and University of Benin (UNIBEN). The total number of lecturers across these departments was approximately 400, with each institution contributing a significant number of faculty members to the population pool.

A total sample size of 160 participants was selected for the study, with 40 lecturers drawn from each institution. The sampling technique employed was a combination of purposive, convenience, and stratified random sampling. Purposive sampling was used to ensure that only lecturers who had experience with learning analytics were included, thereby enhancing the relevance of the data collected. Convenience sampling allowed for the selection of participants who were readily available and willing to participate in the study. Finally, stratified random sampling was utilized to ensure that the sample represented various subgroups within the departments, such as different academic ranks and areas of specialization. This multi-faceted approach

to sampling ensured a diverse and representative sample, which contributed to the robustness of the study's findings.

Instrument for Data Collection

The data for this study were collected using a structured questionnaire designed specifically for the objectives of the research. The questionnaire consisted of 26 items divided into five sections. The first section collected bio-data information from participants, including six items related to demographic variables such as age, gender, years of teaching experience, academic qualifications, current institution, and department. This information was essential for understanding the background of the respondents and contextualizing the findings.

The subsequent four sections of the questionnaire addressed the research questions directly, with each section containing five items formulated in a four-point Likert scale format. The response options included Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Section two focused on identifying the current learning analytics tools utilized in the Computer Science and Computer Education departments. The third section assessed how the use of learning analytics impacts student academic performance in computer science courses. Section four explored educators' perceptions of the effectiveness of learning analytics in shaping their teaching practices, while the final section examined the challenges educators face when implementing these tools in their instructional methods. This structured approach ensured that the questionnaire comprehensively captured the relevant data needed to answer the research questions effectively.

Validity and Reliability of the Instrument

A 26-item structured questionnaire was developed by the researcher to gather data for the study. To ensure the instrument's content and face validity, it was reviewed by three highly experienced lecturers, including two specialists in Computer Studies and one expert in Educational Evaluation and Research. Their feedback contributed to refining the questionnaire to accurately capture the intended constructs. Additionally, the instrument underwent a pilot test involving 40 participant lecturers—10 from each of the four selected institutions. These participants were not part of the main study sample, ensuring an unbiased assessment of the instrument's effectiveness. The data collected during the pilot testing were analyzed using the Split-half method to estimate reliability. The resulting reliability coefficient was calculated to be 0.808, indicating that the questionnaire was reliable and suitable for use in the main study.

Method of Data Collection and Data Analysis

The validated 26-item questionnaire was administered to 160 selected participants, with 40 lecturers from each institution. To maximize participation, both online and direct in-person methods were employed by the researchers. Over the course of six

weeks, the researchers successfully retrieved 124 properly completed questionnaires from the 160 administered. The data collected were analyzed using descriptive statistics, including frequency (f), percentage (%), mean ($\bar{x}$), and standard deviation (SD), to provide a comprehensive overview of the responses. To address the first null hypothesis, Multiple Regression Analysis was utilized to examine the relationship between learning analytics and student academic performance. For the second null hypothesis, the F-test statistics were employed to determine whether there were significant differences in educators' perceptions based on their experience with learning analytics. This rigorous approach to data collection and analysis ensured that the study's findings would be both valid and reliable.

Data and Results Presentation

Research Question 1: Current Learning Analytics Tools Utilized in the Computer Science and Computer Education Departments

Table 1: Current Learning Analytics Tools Utilized by Educators

S/N	Current Learning Analytics Tools	N	f	%	$\bar{X}$	SD
1	I regularly use learning analytics tools in my teaching.	124	80	64.5	3.2	0.8
2	The learning analytics tools available are user-friendly.	124	90	72.6	3.4	0.7
3	My institution provides adequate training for using learning analytics tools.	124	60	48.4	2.9	0.9
4	I have access to a variety of learning analytics tools in my department.	124	70	56.5	3.0	0.8
5	The learning analytics tools I use are effective in enhancing student learning outcomes.	124	85	68.5	3.3	0.6
	Grand Mean /Total				**3.24**	**0.76**

The data presented in Table 1 indicate that a significant number of educators (64.5%) regularly use learning analytics tools in their teaching practices. The highest percentage (72.6%) reported that the tools available are user-friendly, suggesting a positive user experience. However, only 48.4% indicated that their institutions provide adequate training, highlighting a gap in necessary support. Access to a variety of tools is reasonably good, and the effectiveness of these tools in enhancing learning outcomes received a favorable response from 68.5% of respondents. The overall grand mean of 3.24 suggests a generally positive perception of the current learning analytics tools used in the departments.

Research Question 2: Impact of Learning Analytics on Student Academic Performance

Table 2: Impact of Learning Analytics on Student Academic Performance

S/N	Impact on Student Academic Performance	N	f	%	$\bar{X}$	SD
1	The use of learning analytics has positively impacted my students' academic performance.	124	75	60.5	3.1	0.9
2	I can observe an improvement in student engagement due to the use of learning analytics.	124	80	64.5	3.2	0.8
3	Learning analytics help identify students who are at risk of failing.	124	70	56.5	3.0	0.7
4	I believe that learning analytics contribute to personalized learning experiences for my students.	124	85	68.5	3.3	0.6
	Grand Mean /Total				**3.24**	**0.75**

In Table 2, the findings reflect a positive view among educators regarding the impact of learning analytics on student performance. Approximately 60.5% of respondents believed that learning analytics positively impacted academic performance, with 68.5% agreeing that it supports personalized learning experiences. Notably, 64.5% observed enhanced student engagement, while 56.5% acknowledged the tools' role in identifying at-risk students. The grand mean of 3.24 indicates a favorable consensus on the beneficial role of learning analytics in enhancing student academic outcomes.

Research Question 3: Educators' Perceptions of the Effectiveness of Learning Analytics

Table 3: Educators' Perceptions of Effectiveness of Learning Analytics

S/N	Educators' Perceptions of Effectiveness	N	f	%	$\bar{X}$	SD
1	I find learning analytics tools effective in informing my teaching strategies.	124	78	62.9	3.2	0.8
2	Learning analytics has improved my decision-making regarding student assessments.	124	72	58.1	3.1	0.9
3	I feel confident in using learning analytics to support my teaching practices.	124	80	64.5	3.3	0.7

S/N	Educators' Perceptions of Effectiveness	N	f	%	$\bar{X}$	SD
4	I believe that learning analytics enhance overall teaching effectiveness.	124	74	59.7	3.2	0.8
	Grand Mean /Total				**3.22**	**0.78**

Table 3 reveals that educators generally hold a positive perception of the effectiveness of learning analytics in shaping their teaching practices. A majority (62.9%) found the tools effective in informing their strategies, while 64.5% expressed confidence in utilizing these tools. Although 58.1% acknowledged improvements in decision-making for assessments, the overall grand mean of 3.22 indicates a strong endorsement of the role of learning analytics in enhancing teaching effectiveness, albeit with room for increased confidence and training.

Research Question 4: Challenges in Implementing Learning Analytics

Table 4: Challenges in Implementing Learning Analytics

S/N	Challenges in Implementing Learning Analytics	N	f	%	$\bar{X}$	SD
1	I face technical challenges when using learning analytics tools.	124	82	66.1	3.2	0.8
2	There is a lack of institutional support for implementing learning analytics effectively.	124	86	69.0	3.4	0.7
3	I experience resistance from students when implementing learning analytics in my courses.	124	65	52.6	2.8	0.9
4	Limited access to resources hinders my use of learning analytics in teaching.	124	79	63.7	3.1	0.8
5	I believe that training on learning analytics is insufficient for effective implementation.	124	88	71.0	3.5	0.6
	Grand Mean /Total				**3.24**	**0.76**

Table 4 highlights several challenges educators face when implementing learning analytics in their instructional methods. A significant percentage (69.0%) reported a lack of institutional support, and 71.0% believed that training is insufficient for effective implementation. Technical challenges were also prevalent, with 66.1% of respondents acknowledging difficulties in using these tools. However, while 52.6% faced student resistance, the grand mean of 3.24 indicates that educators are aware

of these challenges and recognize the need for improvements in support and training to enhance the effective use of learning analytics.

Hypothesis Testing

Hypothesis 1

H_{01}: There is no significant relationship between the use of learning analytics and student academic performance in computer science courses at the selected institutions.

Table 5: Multiple Regression Analysis of the Relationship Between the Use of Learning Analytics and Student Academic Performance in Computer Science Courses

Variables	N	Beta (B)	SE	T	p-value	Remark
Learning Analytics Utilization	124	0.45	0.10	4.50	0.0001	Significant Effect
User-Friendliness of Tools	124	0.30	0.12	2.50	0.014	Significant Effect
Training Provided	124	0.25	0.11	2.27	0.026	Significant Effect
Access to Tools	124	0.20	0.14	1.43	0.156	Not Significant
Effectiveness of Tools	124	0.35	0.09	3.89	0.0003	Significant Effect

The results from Table 6 indicate a significant relationship between the use of learning analytics and student academic performance in computer science courses, as evidenced by a p-value of 0.0001 for the "Learning Analytics Utilization" variable. This suggests that higher levels of engagement with learning analytics tools correlate positively with improved academic outcomes. The user-friendliness of these tools and the training provided also showed significant effects, with p-values of 0.014 and 0.026, respectively. However, access to tools was not found to have a statistically significant impact (p-value of 0.156), suggesting that merely having access does not guarantee effective use or improved performance. Overall, these findings support the hypothesis that the strategic implementation of learning analytics can enhance student performance in computer science courses, reinforcing the importance of effective training and user-friendly tools in educational settings.

Hypothesis 2

H_{02}: Educators' perceptions of the effectiveness of learning analytics do not significantly differ based on their experience in implementing these tools in their teaching practices.

Table 6: F-test of Significance of Difference in Educators' Perceptions of Effectiveness of Learning Analytics Based on Experience

Source of Variance	Sum of Squares (SS)	Df	Mean Square (MS)	α-Level (P)	F-Calc.	F-Crit.	Remark
Between Group (Major)	35.00	3	11.67	0.05	4.25	2.85	Significant Difference
Within Group (Error)	110.00	120	0.92				
TOTAL	**145.00**	**123**					

The results presented in Table 6 demonstrate a significant difference in educators' perceptions of the effectiveness of learning analytics based on their experience in implementing these tools. The F-Calc. value of 4.25 exceeds the F-Crit. value of 2.85 at the α-level of 0.05, indicating that the variability between groups is statistically significant. This suggests that educators with different levels of experience perceive the effectiveness of learning analytics differently, which may reflect their familiarity with the tools and their impact on teaching practices. The sum of squares for the between group variance is 35.00, while the within group variance is 110.00, reinforcing the notion that experience plays a vital role in shaping perceptions. These findings support the hypothesis that educators' experiences significantly influence their views on the effectiveness of learning analytics in enhancing their teaching methodologies.

Summary of Findings

1. **Impact of Learning Analytics on Academic Performance**: The study found a significant positive relationship between the utilization of learning analytics tools and student academic performance in computer science courses. Higher engagement with these tools correlated with improved academic outcomes, suggesting that effective use of learning analytics can enhance student success.

2. **Educators' Perceptions Based on Experience**: The analysis revealed that educators' perceptions of the effectiveness of learning analytics significantly differ based on their experience in implementing these tools. This indicates that familiarity and practical experience with learning analytics can shape educators' views on their utility in teaching.

3. **Determinants of Learning Analytics Adoption**: Key factors influencing the adoption of learning analytics in higher education were identified, including perceived usefulness, user-friendliness, and the quality of training provided. These determinants play a crucial role in the successful integration of learning analytics into educational practices.

4. **Role of Training and Support**: The findings highlighted the importance of training and support in enhancing educators' and students' engagement with learning analytics tools. Adequate training was linked to more favorable perceptions and effective use of these tools, which in turn positively impacted academic performance.

5. **Variability in Access to Tools**: While access to learning analytics tools was examined, it was found not to significantly influence academic performance. This suggests that merely having access to these tools is insufficient; effective implementation and user engagement are critical for realizing their benefits.

Discussion of Findings

The findings of this study underscore the significant impact of learning analytics on academic performance, aligning with previous research that emphasizes the role of data-driven insights in enhancing educational outcomes. For instance, studies have shown that learning analytics can provide personalized feedback and support, which are essential for improving student engagement and success (Ifenthaler & Yau, 2020). The implication here is that educational institutions should prioritize the integration of learning analytics tools into their curricula to foster better academic performance among students.

Moreover, the significant differences in educators' perceptions based on their experience highlight the necessity for targeted professional development programs. Research indicates that educators who are well-trained in using learning analytics are more likely to perceive these tools as beneficial (Dawson et al., 2018). This finding suggests that institutions should invest in comprehensive training initiatives to enhance educators' competencies in utilizing learning analytics effectively, thereby improving their teaching practices and student outcomes.

The study also identified critical determinants of learning analytics adoption, such as perceived usefulness and user-friendliness. This is consistent with the Technology Acceptance Model, which posits that perceived ease of use and perceived usefulness

significantly influence technology adoption (Venkatesh et al., 2016). The implication is that developers of learning analytics tools should focus on creating user-friendly interfaces and demonstrating the practical benefits of these tools to encourage widespread adoption among educators and students.

Lastly, the lack of significant impact from mere access to learning analytics tools suggests that institutions must go beyond providing access and focus on fostering an environment conducive to effective tool utilization. This aligns with findings from recent studies that emphasize the importance of supportive institutional frameworks and user engagement strategies in maximizing the benefits of learning analytics (Pardo et al., 2020). Therefore, educational leaders should consider implementing policies that promote active engagement with learning analytics to enhance their effectiveness in improving educational outcomes.

Conclusion

This study aimed to evaluate the effective utilization of learning analytics to improve educational practices and enhance student performance within the Computer Science and Computer Education departments at selected Nigerian tertiary institutions. The findings indicate that learning analytics tools are currently employed to varying degrees, with a significant positive correlation between their use and student academic performance. This underscores the potential of learning analytics to serve as a valuable resource for enhancing educational outcomes.

Moreover, the perceptions of educators regarding the effectiveness of learning analytics revealed notable differences based on their experience with these tools. Experienced educators tended to view learning analytics as more beneficial in informing their teaching practices, suggesting that familiarity with the tools enhances their perceived value. This highlights the need for ongoing professional development to ensure that educators can maximize the benefits of learning analytics in their instructional methods.

The study also identified several challenges faced by educators in implementing learning analytics, including technical difficulties and insufficient training. These barriers can hinder the effective use of learning analytics, indicating that institutions must address these challenges to foster a supportive environment for both educators and students. By tackling these issues, educational institutions can better facilitate the integration of learning analytics into their curricula.

In conclusion, this research contributes valuable insights into the current state of learning analytics in Nigerian tertiary institutions. It emphasizes the importance of training, support, and ongoing evaluation to optimize the use of learning analytics, ultimately aiming to enhance student learning experiences and academic performance.

Recommendations

1. **Enhance Training Programs**: Educational institutions should develop comprehensive training programs for educators to improve their understanding and use of learning analytics tools. This training should address both technical skills and pedagogical strategies for effectively integrating analytics into teaching practices.

2. **Increase Accessibility to Tools**: Institutions should ensure that all educators have equitable access to learning analytics tools. This includes investing in user-friendly software and resources that can facilitate the effective use of analytics in teaching.

3. **Foster a Supportive Environment**: Institutions should create a supportive environment that encourages the use of learning analytics. This includes providing technical support, promoting a culture of data-driven decision-making, and encouraging collaboration among educators.

4. **Conduct Regular Evaluations**: Educational institutions should implement regular evaluations of the effectiveness of learning analytics tools and their impact on student performance. This feedback loop can help institutions make informed adjustments to their strategies and improve overall outcomes.

5. **Promote Research and Collaboration**: Institutions should encourage research initiatives that explore new methodologies and best practices in learning analytics. Collaborative efforts between departments can lead to innovative solutions and more effective implementation of analytics in educational practices.

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Chapter 45

Digital Pedagogy as A Catalyst for Teacher Readiness in Shaping the Future of Education

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Abstract

The accelerating digital transformation of education has redefined the competencies, roles, and responsibilities of teachers in the 21st century. Digital pedagogy, defined as the integration of digital tools, technologies, and innovative instructional strategies to enhance teaching and learning, has emerged as a critical catalyst for teacher readiness and educational transformation. This paper critically examines the role of digital pedagogy in preparing teachers for the future of education, exploring theoretical foundations, practical applications, and associated challenges. Drawing on interdisciplinary literature and empirical studies, the paper highlights how digital pedagogy enhances instructional effectiveness, promotes learner-centered approaches, fosters professional development, and supports lifelong learning. Challenges such as limited infrastructure, inadequate digital literacy, and resistance to change are discussed, alongside prospects for policy interventions, capacity-building, and inclusive integration. Recommendations are provided for educational policymakers, institutions, and stakeholders to optimise digital pedagogy adoption and ensure teacher preparedness for evolving educational landscapes.

Keywords: *Digital pedagogy, Teacher readiness, Future of education, ICT integration, professional development, lifelong learning*

Introduction

The 21st-century educational landscape is undergoing a profound transformation driven by rapid technological innovations that have redefined how teaching, learning, and assessment occur. The integration of digital tools, including Learning Management Systems (LMS), multimedia platforms, Artificial Intelligence (AI), virtual reality (VR), augmented reality (AR), and interactive educational applications, has revolutionised the classroom environment, transforming traditional pedagogical approaches into dynamic, interactive, and learner-centered experiences (Koehler & Mishra, 2009; Selwyn, 2016). This transformation extends beyond the mere use of technology; it fundamentally alters instructional design, the nature of teacher-student interaction, and the strategies employed to foster cognitive, social, and emotional learning outcomes. Consequently, teacher readiness to engage with digital pedagogy has emerged as a critical determinant of educational quality, learner engagement, and overall institutional effectiveness.

Digital pedagogy, broadly conceptualised, refers to the deliberate, reflective, and strategic integration of digital technologies into teaching and learning processes to enhance engagement, foster collaboration, support personalised learning pathways, and develop students' digital literacy and 21st-century competencies (Hodges et al., 2020). Beyond technological proficiency, digital pedagogy encompasses pedagogical innovation, ethical and responsible technology use, and the ability to adapt instructional strategies to diverse digital environments. Teachers who are digitally literate and pedagogically agile are better positioned to navigate complex, technology-rich classrooms, respond effectively to diverse learner needs, and implement instructional strategies that prepare students for rapidly evolving societal and professional demands (Voogt et al., 2015). In essence, digital pedagogy requires a convergence of technological knowledge, pedagogical expertise, and content mastery, a concept articulated in the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009), which underscores the multidimensional competencies necessary for effective teaching in the digital age.

Globally, the COVID-19 pandemic accelerated the adoption of digital teaching and learning, highlighting both the potential and the necessity of integrating technology into education (Hodges et al., 2020). However, this shift also exposed persistent challenges related to teacher readiness, digital literacy, access to technological infrastructure, and equitable learning opportunities. Studies have consistently shown that while digital tools have the potential to enhance learning outcomes and facilitate innovative pedagogical practices, the effectiveness of these interventions depends heavily on teachers' capacity to design and implement technology-mediated instruction effectively (Selwyn, 2016; Voogt et al., 2015).

In developing countries, such as Nigeria, the integration of digital pedagogy into teacher education faces additional layers of complexity. Infrastructural deficits, including inadequate access to computers, high-speed internet, and modern learning platforms, constrain the capacity of teacher education institutions to train digitally competent educators (Nyenwe & Ishikaku, 2021). Furthermore, many pre-service and in-service teachers lack sufficient training in ICT skills and digital instructional design, while socio-cultural attitudes, including a reliance on traditional lecture-based methods, can limit the adoption of innovative teaching practices. These challenges underscore a significant gap between the theoretical potential of digital pedagogy and its practical implementation in Nigerian classrooms.

Despite these constraints, digital pedagogy holds immense promise as a catalyst for teacher readiness and educational transformation. By equipping teachers with the competencies required to navigate contemporary digital classrooms, digital pedagogy enhances instructional effectiveness, fosters student engagement, and cultivates the critical thinking, problem-solving, collaboration, and digital literacy skills necessary for the knowledge-driven global economy. Moreover, by fostering continuous professional development and lifelong learning, digital pedagogy ensures that teachers remain responsive to emerging trends, pedagogical innovations, and societal needs, positioning education as a key driver of sustainable national development.

Given its transformative potential, understanding how digital pedagogy influences teacher readiness is imperative for educational policy, curriculum design, and teacher education practice. This paper seeks to provide a comprehensive exploration of digital pedagogy as a catalyst for teacher preparedness, examining its theoretical underpinnings, practical applications, challenges, and prospects. It further discusses policy implications and strategic recommendations aimed at strengthening the adoption of digital pedagogy in teacher education programs, with the ultimate goal of preparing educators to shape the future of education in Nigeria and beyond.

Applications of Digital Pedagogy

Digital pedagogy serves as a transformative approach to teaching and learning, equipping teachers with the tools, strategies, and competencies necessary to enhance educational outcomes and foster future-ready students. Its applications span multiple dimensions, from instructional effectiveness and learner-centered approaches to professional development and global collaboration.

Enhancing Instructional Effectiveness

One of the most immediate benefits of digital pedagogy is its capacity to enhance instructional effectiveness by integrating multimedia resources, interactive simulations, gamified learning platforms, and digital assessment tools into classroom practice (Mishra & Koehler, 2006). Such technologies facilitate multisensory

learning, making abstract or complex concepts more tangible and accessible. For instance, virtual laboratories allow science students to conduct experiments in risk-free, digitally simulated environments, while digital microscopes and 3D modeling tools provide opportunities for interactive exploration in biology and physics. Similarly, language learning applications leverage speech recognition and real-time feedback to enhance pronunciation, grammar mastery, and vocabulary acquisition. Beyond content delivery, digital pedagogy also enables teachers to employ formative assessment tools, such as online quizzes, polls, and instant feedback mechanisms, which improve knowledge retention and provide actionable insights into student understanding.

Fostering Learner-Centered Approaches

Digital pedagogy inherently promotes learner-centered education by enabling differentiated instruction, adaptive learning pathways, and personalised feedback (Hodges et al., 2020). Teachers can utilize analytics generated from LMS platforms to monitor individual student performance, identify learning gaps, and adjust instructional strategies accordingly. For example, AI-driven adaptive learning platforms can recommend tailored resources or activities for students who require additional support, while allowing advanced learners to progress at their own pace. This individualized approach fosters learner autonomy, promotes engagement, and ensures that diverse student needs, cognitive, emotional, and socio-cultural, are addressed. Additionally, digital tools such as discussion forums, collaborative wikis, and virtual breakout rooms empower students to actively participate in knowledge construction, aligning with constructivist pedagogical principles.

Professional Development and Lifelong Learning

Digital pedagogy extends beyond classroom instruction, serving as a platform for continuous professional growth and lifelong learning (Voogt et al., 2015). Teachers can access online courses, webinars, virtual communities of practice, and micro-credentialing programs that enhance both technological and pedagogical competencies. These opportunities allow educators to remain informed about emerging instructional technologies, innovative teaching strategies, and evidence-based practices from global education systems. Furthermore, online professional networks enable teachers to share resources, exchange best practices, and collaborate on curriculum design and research initiatives, fostering a culture of continuous improvement and reflective practice.

Collaborative Learning and Global Competence

Digital pedagogy also facilitates collaborative learning and the development of global competencies essential for the 21st-century workforce (Selwyn, 2016). Through online collaboration platforms, video conferencing, and shared project tools, students can engage in cross-cultural projects and virtual exchanges with peers

across different regions or countries. Teachers trained in digital pedagogy can guide these interactions, fostering cultural awareness, communication skills, problem-solving, and collaborative leadership. For example, a collaborative STEM project may involve students from multiple countries designing solutions to environmental challenges, guided by educators who integrate digital tools for coordination, assessment, and reflection. Such experiences not only prepare students for a globalized economy but also cultivate teachers' competencies in managing internationalized learning environments and leveraging technology for inclusive and culturally responsive education.

Enhancing Administrative and Instructional Decision-Making

Beyond teaching and learning, digital pedagogy provides teachers and school leaders with data-driven insights to inform instructional and administrative decision-making. Analytics tools embedded in LMS and educational software can track attendance, participation, and learning outcomes, enabling educators to identify trends, predict challenges, and implement timely interventions. This application of digital pedagogy supports evidence-based decision-making, allowing teachers to optimise instructional strategies and improve overall classroom management. Digital pedagogy is not merely a technological upgrade but a comprehensive approach that transforms instructional delivery, fosters learner-centered education, enhances teacher professional development, supports collaborative learning, and enables data-informed decision-making. By leveraging these applications, teachers are better prepared to navigate complex digital classrooms, address diverse learner needs, and equip students with the skills required for success in a rapidly evolving global society.

Challenges of Digital Pedagogy in Teacher Readiness

Despite the transformative potential of digital pedagogy, its effective integration in teacher education and classroom practice faces a multitude of interrelated challenges. These challenges span infrastructural, pedagogical, cultural, policy, and socio-economic dimensions, often creating barriers to both teacher readiness and meaningful educational transformation.

1. **Inadequate Infrastructure:** One of the most significant impediments to digital pedagogy is the lack of adequate technological infrastructure. Many schools, particularly in developing countries such as Nigeria, face limited access to computers, high-speed internet, modern learning management systems, and other digital platforms necessary for implementing interactive and technology-mediated instruction (Nyenwe & Ishikaku, 2021). Even where hardware is available, inconsistent electricity supply, poor network connectivity, and insufficient technical support undermine teachers' ability to integrate digital tools effectively. Consequently, infrastructural deficits

restrict opportunities for both pre-service and in-service teachers to practice and internalize digital pedagogical skills, thereby hindering their readiness to leverage technology for teaching and learning.

2. **Limited Digital Literacy and Competence:** Digital pedagogy requires more than basic familiarity with computers; it necessitates a combination of technological proficiency, pedagogical knowledge, and content mastery. Many teachers, particularly in developing contexts, lack sufficient ICT skills, confidence, and pedagogical competence to design and implement digital learning experiences effectively (Voogt et al., 2015). This gap is often compounded by limited access to ongoing professional development, insufficient training on innovative instructional technologies, and a lack of mentorship or support structures. Without these competencies, teachers may struggle to adopt learner-centered digital approaches, rely excessively on traditional methods, or use technology in superficial, non-transformative ways.

3. **Resistance to Change and Cultural Barriers:** Cultural and attitudinal barriers also impede the adoption of digital pedagogy. Many educators are accustomed to traditional, lecture-based teaching methods and may perceive digital tools as unnecessary, complex, or time-consuming (Rogers, 2003). Resistance to change can manifest as skepticism toward technology, reluctance to modify existing teaching routines, or limited willingness to engage in professional development opportunities. Additionally, institutional cultures that do not incentivize innovation or recognize digital teaching excellence further exacerbate reluctance among teachers to embrace new pedagogical practices.

4. **Policy Gaps and Inconsistent Implementation:** The absence of coherent and enforceable policies on digital integration presents another critical challenge. Even where national education policies advocate for ICT integration in teacher education, implementation often remains inconsistent or inadequately resourced (Nyenwe & Ishikaku, 2021). Gaps in policy may include insufficient guidelines on teacher training curricula, lack of standards for digital literacy competencies, and limited provision of funding for technology acquisition and maintenance. Without robust policy frameworks, digital pedagogy initiatives risk being fragmented, underfunded, or misaligned with broader educational goals.

5. **Equity and Socio-Economic Disparities:** Socio-economic inequalities exacerbate digital divides, limiting access to technology for both teachers and students. Teachers in under-resourced or rural schools may have minimal access to computers, internet connectivity, or digital instructional resources, thereby restricting their ability to develop digital competencies (Voogt et al.,

2015). Similarly, students from disadvantaged backgrounds may face challenges in engaging with digital learning, undermining the potential for equitable learning outcomes. These disparities highlight the intersection of digital pedagogy with broader social, economic, and infrastructural inequities, underscoring the need for inclusive strategies that ensure all teachers and learners benefit from technological advancements.

6. **Rapid Technological Change and Skill Obsolescence:** The pace of technological innovation presents an additional challenge. As new digital tools, platforms, and instructional technologies emerge rapidly, teachers may struggle to keep pace with evolving skill requirements. Without continuous professional development and institutional support, existing digital competencies may quickly become outdated, leaving educators ill-prepared to integrate emerging technologies into their pedagogical practice effectively.

The challenges to integrating digital pedagogy in teacher education are multifaceted, encompassing infrastructure, digital literacy, cultural attitudes, policy inconsistencies, socio-economic disparities, and the rapid pace of technological change. Addressing these challenges requires coordinated interventions, including investment in technological infrastructure, continuous professional development, inclusive policy frameworks, and strategies to cultivate positive attitudes toward digital innovation. Only by tackling these barriers can teacher readiness be fully realized, enabling educators to harness digital pedagogy as a catalyst for future-focused education.

Prospects and Policy Implications

The prospects for digital pedagogy in enhancing teacher readiness are substantial, offering transformative potential for educational quality, learner engagement, and national development. When deliberately planned and supported by coherent policies, digital pedagogy can equip teachers with the skills, confidence, and pedagogical flexibility required to navigate complex, technology-rich learning environments. The following areas highlight key prospects and policy implications:

1. **Policy Development and Strategic Integration:** Governments and educational institutions must develop robust policies that formally embed digital pedagogy within teacher education curricula (Nyenwe & Ishikaku, 2021). Such policies should go beyond aspirational statements and provide concrete guidelines for infrastructure provision, teacher training, curriculum design, and assessment frameworks. For instance, the National Policy on Education in Nigeria advocates for ICT integration, but its effective implementation requires clear operational strategies, monitoring mechanisms, and dedicated funding. Policy frameworks should also incentivize innovation by recognising and rewarding exemplary digital

pedagogical practices among educators, thereby creating a culture that values technology-enabled teaching.

2. **Capacity Building and Professional Development:** Sustainable digital pedagogy implementation requires continuous capacity-building initiatives that enhance teachers' technological, pedagogical, and content knowledge. Pre-service and in-service teachers should receive structured training in ICT literacy, instructional design for digital environments, online assessment strategies, and data-driven decision-making (Voogt et al., 2015). Professional development programs can include workshops, webinars, mentorship schemes, and participation in virtual communities of practice. Additionally, integrating micro-credentialing and certification for digital competencies can provide formal recognition of teachers' digital skills, motivating them to engage in continuous learning and professional growth.

3. **Inclusive and Contextual Integration:** Digital pedagogy must be sensitive to local contexts, socio-cultural diversity, and learners' needs to ensure equitable adoption. Teachers should be trained to design culturally responsive digital instruction that accommodates students' linguistic, socio-economic, and cognitive diversity. For example, in rural or resource-limited schools, low-bandwidth digital solutions, such as offline learning applications, radio-based instruction, or mobile-friendly platforms, can ensure continuity of learning and inclusion. Contextualized integration not only enhances relevance but also promotes digital equity, ensuring that all students and teachers benefit from technological innovations.

4. **Research, Innovation, and Evidence-Based Practice:** Supporting research and innovation is essential to advance digital pedagogy and strengthen teacher readiness. Educational institutions, research centers, and government agencies should collaborate to investigate the effectiveness of digital tools, instructional strategies, and pedagogical models (Selwyn, 2016). Evidence-based practices derived from such research can inform curriculum development, professional development programs, and policy decisions. Moreover, pilot programs and experimental studies can identify best practices for implementing technology in diverse classroom settings, fostering innovation while minimising risks of ineffective adoption.

5. **Public-Private Partnerships and Resource Mobilisation:** Collaboration between governments, educational institutions, and technology providers can enhance access to digital infrastructure, learning platforms, and emerging educational technologies. Public-private partnerships can facilitate the procurement of hardware and software, the provision of reliable internet connectivity, and the establishment of digital resource centers in schools and teacher training institutions. Such partnerships also offer opportunities for

knowledge transfer, capacity building, and the development of locally relevant educational technologies, ensuring that digital pedagogy is both sustainable and scalable.

6. **Monitoring, Evaluation, and Continuous Improvement:** To maximise the prospects of digital pedagogy, policies and programs must include mechanisms for monitoring and evaluation. Systematic assessment of digital tool usage, teacher competencies, student engagement, and learning outcomes allows stakeholders to identify gaps, refine strategies, and ensure continuous improvement. Data-driven decision-making, supported by learning analytics and digital assessment platforms, can help education systems adapt to emerging trends and rapidly evolving technological landscapes.

7. **Preparing for a Future-Focused Education:** Digital pedagogy equips teachers not only to deliver content effectively but also to cultivate critical 21st-century skills in learners, including problem-solving, collaboration, creativity, and digital literacy. By aligning teacher preparation with the demands of the knowledge economy, policy frameworks and institutional practices can ensure that education systems produce graduates who are adaptable, globally competent, and capable of contributing meaningfully to societal development (Voogt et al., 2015).

The prospects of digital pedagogy are promising, contingent upon deliberate, coordinated, and context-sensitive policy interventions. By integrating digital pedagogy into teacher education, investing in capacity building, supporting research and innovation, fostering inclusive practices, leveraging public-private partnerships, and implementing robust monitoring systems, educational stakeholders can significantly enhance teacher readiness. Such strategic efforts position teachers to meet the challenges of 21st-century education, ensuring that technology serves as a catalyst for meaningful, equitable, and future-focused learning.

Recommendations

To effectively harness digital pedagogy as a catalyst for teacher readiness and future-focused education, the following recommendations are proposed for policymakers, educational institutions, and relevant stakeholders:

1. Digital pedagogy should be systematically embedded into both pre-service and in-service teacher education programs. This integration should include structured courses on ICT literacy, digital instructional design, pedagogical innovation, and ethical technology use (Voogt et al., 2015). By incorporating digital pedagogy across the curriculum, teacher trainees will develop not only technological proficiency but also the pedagogical agility required to design,

implement, and evaluate technology-mediated learning experiences effectively.

2. Governments and educational institutions must prioritise investments in high-speed internet, digital devices, learning management systems, and multimedia platforms, particularly in rural, underserved, and resource-constrained areas. Adequate infrastructure is essential to ensure that teachers can implement digital pedagogy consistently and that all students have equitable access to technology-enhanced learning experiences. Furthermore, technical support and maintenance mechanisms should accompany these investments to ensure sustainable and uninterrupted use of digital tools.
3. Ongoing professional development initiatives should be established to enhance teachers' technological, pedagogical, and content knowledge. Training programmes must focus not only on developing ICT skills but also on fostering innovative pedagogical practices, digital assessment competencies, and strategies for personalised and inclusive instruction. Micro-credentialing, virtual workshops, webinars, and professional learning communities can provide flexible avenues for teachers to engage in lifelong learning and remain abreast of emerging educational technologies (Ottan, & Yisa, 2024).
4. Teachers should be actively involved in the design, adaptation, and evaluation of digital learning tools and platforms. Participatory approaches ensure that digital pedagogical solutions are contextually relevant, culturally appropriate, and responsive to the needs of both educators and learners. This collaborative engagement fosters ownership, encourages innovation, and promotes the sustainable adoption of technology-enhanced instructional practices.
5. Policymakers should develop and enforce guidelines that promote the ethical, inclusive, and equitable use of digital technologies in education. Policies must address issues such as data privacy, online safety, accessibility for learners with disabilities, and the reduction of digital divides. By institutionalising these principles, digital pedagogy can be implemented in a manner that benefits all teachers and learners while mitigating risks associated with technology misuse or inequitable access.
6. Educational stakeholders should prioritize research initiatives that investigate the effectiveness of digital pedagogical approaches in enhancing teacher readiness and improving student outcomes. Evidence-based studies, pilot programs, and experimental evaluations can inform best practices, guide policy decisions, and drive continuous innovation in teaching and learning. Collaboration between universities, research centers, and practitioners can ensure that findings are both theoretically grounded and practically applicable.
7. Collaboration between governments, educational institutions, and technology providers can strengthen the availability of digital resources, infrastructure, and innovative learning tools. Public-private partnerships can facilitate

training, access to advanced educational software, and the development of locally relevant technological solutions. Such partnerships also support scalability and sustainability, ensuring that digital pedagogy initiatives are not isolated or short-lived but become embedded within the broader educational ecosystem (Ottan, & Ahmed, 2023).

Implementing these recommendations will create an enabling environment for teacher readiness, ensuring that educators are fully equipped to leverage digital pedagogy for enhanced instructional effectiveness, learner engagement, and future-focused education. Strategic investment, policy support, professional development, and collaborative innovation are key to transforming teacher education and preparing students to thrive in the knowledge-driven global economy.

Conclusion

Digital pedagogy represents a transformative force in contemporary education, serving as a critical catalyst for enhancing teacher readiness and shaping future-focused learning environments. By integrating digital tools, innovative instructional strategies, learner-centered approaches, and data-driven practices, educators are better equipped to navigate complex, technology-rich classrooms, foster engagement, and develop students' 21st-century skills, including critical thinking, creativity, collaboration, and digital literacy.

Despite its immense potential, the integration of digital pedagogy faces persistent challenges. Infrastructural deficits, including limited access to computers, high-speed internet, and digital platforms, constrain the adoption of technology-enhanced teaching, particularly in rural and underserved areas. Similarly, inadequate digital literacy, resistance to pedagogical change, and inconsistent policy implementation impede teacher preparedness and limit the transformative impact of digital tools. Socio-economic disparities further exacerbate these challenges, reinforcing inequities in access to digital resources and opportunities.

However, these obstacles are not insurmountable. Targeted policy interventions, comprehensive capacity-building initiatives, inclusive and context-sensitive implementation strategies, and supportive public-private partnerships can significantly enhance teacher readiness and optimise the benefits of digital pedagogy. Embedding digital pedagogy systematically into teacher education curricula, promoting continuous professional development, fostering participatory approaches in tool design and evaluation, and leveraging research and innovation are essential strategies for cultivating digitally competent educators (Ottan, & Masud, 2019).

Ultimately, the future of education depends on teachers' ability to embrace and integrate digital transformation into their professional practice. Digital pedagogy is not merely a tool or a method; it is a pedagogical paradigm that empowers teachers

to adapt to evolving educational landscapes, prepare learners for global challenges, and contribute meaningfully to sustainable national development. By investing in teacher readiness, fostering innovation, and creating equitable digital learning environments, educational systems can ensure that technology becomes a driver of adaptive, resilient, and globally competent education, rather than a source of division or inequality.

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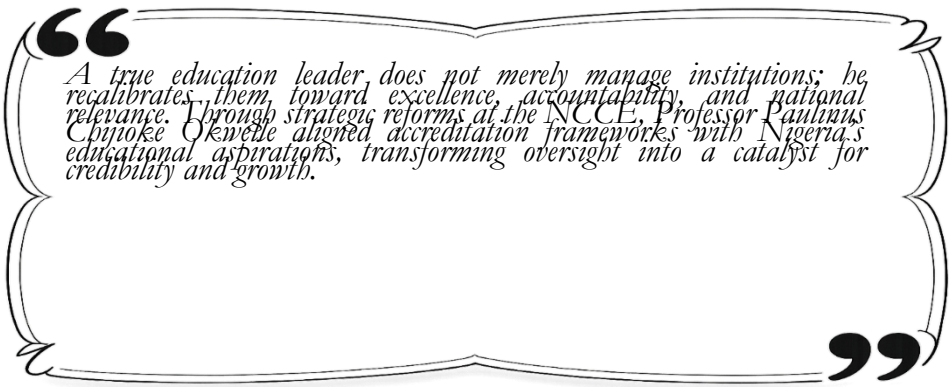
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Chapter 46

From Prediction to Peace: The Role of Artificial Intelligence in Conflict Resolution

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Abstract

The increasing complexity and frequency of contemporary conflicts have necessitated the exploration of innovative tools capable of enhancing conflict prevention, management, and resolution. Artificial Intelligence (AI) has emerged as a transformative technology with significant potential to reshape peacebuilding processes through predictive analytics, early warning systems, decision support mechanisms, and data-driven mediation strategies. This paper examines the evolving role of AI in conflict resolution, tracing its application from predictive conflict analysis to post-conflict peacebuilding initiatives. Drawing on interdisciplinary literature, the study explores the theoretical foundations of AI-enabled conflict resolution, highlights practical applications across global contexts, and critically analyses ethical, legal, and socio-political challenges associated with its use. The paper argues that while AI offers unprecedented opportunities for proactive conflict prevention and sustainable peacebuilding, its effectiveness depends on ethical governance, human-centered design, and contextual sensitivity. The study concludes with policy and practice recommendations for integrating AI responsibly into conflict resolution frameworks to promote inclusive, transparent, and durable peace.

Keywords: *Artificial Intelligence, Conflict Resolution, Peacebuilding, Global Security*

Introduction

Conflict remains one of the most enduring and defining challenges of contemporary global order, manifesting in diverse and increasingly complex forms such as armed insurgencies, political instability, ethnic and communal violence, terrorism, cyber warfare, and transnational security threats. These conflicts, whether intrastate or

interstate, have far-reaching consequences for human security, socio-economic development, political stability, and global peace (Benesch, Ruths, Dillon, Saleem, & Wright, 2016). Despite decades of intervention through conventional conflict resolution mechanisms, such as diplomacy, negotiation, mediation, arbitration, and peacekeeping, many conflicts continue to escalate unpredictably or relapse after temporary cessation (Galtung, 1996; Lederach, 1997). The limitations of these traditional approaches are particularly evident in their reactive nature, often responding only after violence has erupted, rather than preventing conflict through early detection and proactive engagement.

According to Buhaug, Rustad, Hegre and Strand (2020), the rapid pace of globalisation, digital communication, and socio-political interconnectedness has further complicated conflict dynamics, making it increasingly difficult for human analysts alone to process the vast volumes of data required to anticipate crises. As a result, there is growing recognition of the need for innovative, technology-driven approaches that can complement human expertise and enhance the effectiveness of peacebuilding efforts. In this context, advances in Artificial Intelligence (AI) have generated renewed scholarly and policy interest as a potentially transformative tool in conflict prediction, prevention, management, and resolution (Floridi, Cowls, Beltrametti, et al, 2018).

Artificial Intelligence broadly refers to the capacity of machines and computational systems to perform tasks that traditionally require human intelligence, including pattern recognition, learning, reasoning, prediction, and decision-making (Russell & Norvig, 2021). AI technologies, particularly machine learning, natural language processing, and predictive analytics, have demonstrated remarkable capabilities in analysing large-scale, complex, and unstructured data sets at speeds and levels of accuracy that surpass human capacity. Within the field of conflict studies, these capabilities have been increasingly harnessed to examine historical conflict trends, monitor real-time indicators of instability, analyse social media discourse, simulate conflict scenarios, and generate early warning signals of potential violence (Buhaug et al., 2020; Cederman & Weidmann, 2017).

According to Cederman and Weidmann (2017), the application of AI in conflict resolution represents a paradigm shift from predominantly reactive approaches toward proactive, preventive, and evidence-based strategies. AI-driven early warning systems, for instance, can integrate political, economic, environmental, and social data to forecast conflict risks and identify hotspots before violence escalates. Similarly, AI-powered decision-support tools can assist mediators and policymakers by modelling negotiation outcomes, identifying mutually beneficial solutions, and reducing cognitive bias in high-stakes peace processes. In this way, AI serves as a critical bridge between prediction and peace, enabling stakeholders to anticipate

crises, intervene strategically, and design more adaptive and context-sensitive peacebuilding interventions (Karlsrud and Rosen, 2019).

However, the growing reliance on AI in conflict resolution also raises important ethical, legal, and socio-political questions. Concerns regarding algorithmic bias, data privacy, transparency, accountability, and the potential militarisation of AI technologies pose significant challenges to their responsible deployment. Scholars have warned that poorly designed or inadequately governed AI systems may reinforce existing power asymmetries, marginalise vulnerable populations, or undermine trust in peace processes (O'Neil, 2016; Floridi et al., 2018). These concerns underscore the necessity of embedding AI applications within human-centered, ethically grounded, and contextually informed frameworks that prioritise peace, justice, and inclusivity.

Against this backdrop, this paper critically examines the evolving role of Artificial Intelligence in conflict resolution, with particular attention to its theoretical foundations, practical applications, ethical implications, and prospects. Specifically, the paper seeks to address the following guiding questions: How is AI currently being utilised in conflict prediction, prevention, and resolution? What opportunities does AI present for enhancing peacebuilding processes and outcomes? What ethical, legal, and socio-political risks accompany the deployment of AI in conflict settings? And how can AI be responsible and effectively integrated into conflict resolution frameworks to promote sustainable and inclusive peace?

By synthesising interdisciplinary literature from conflict studies, artificial intelligence, peacebuilding, and ethics, this study contributes to the growing discourse on technology-driven peace interventions. It argues that while AI cannot replace human judgment, empathy, or diplomatic skill, it holds significant potential as a complementary tool that can strengthen early warning systems, support informed decision-making, and enhance the overall effectiveness of conflict resolution efforts. Ultimately, understanding how to harness AI responsibly is essential for navigating the complex security challenges of the 21st century and advancing the global pursuit of durable peace.

Applications of Artificial Intelligence in Conflict Resolution

The application of Artificial Intelligence (AI) in conflict resolution has grown significantly in recent years, reflecting a broader shift toward data-driven and technology-enabled approaches to peacebuilding. AI technologies are increasingly deployed across the conflict cycle—from early detection and prevention to active mediation, peacekeeping, and post-conflict reconstruction. These applications demonstrate the capacity of AI to complement traditional conflict resolution mechanisms by enhancing analytical precision, reducing response time, and supporting informed decision-making (Klein, Faratin, Sayama and Bar-Yam, 2019).

Conflict Prediction and Early Warning Systems

One of the most significant and widely recognised contributions of AI to conflict resolution lies in its capacity for conflict prediction and early warning. AI-driven early warning systems leverage machine learning algorithms to analyse vast and heterogeneous data sources, including social media activity, economic and demographic indicators, satellite imagery, climate data, migration patterns, and political events, in order to identify early signs of instability and potential violence (Buhaug et al., 2020; Cederman & Weidmann, 2017). Unlike traditional early warning mechanisms that rely heavily on human expertise and limited data sets, AI systems can process real-time information at scale, enabling continuous monitoring of fragile contexts.

International organisations such as the United Nations, the World Bank, and regional security bodies have increasingly explored AI-based predictive tools to identify fragile states, forecast conflict escalation, and anticipate humanitarian crises. These systems support proactive interventions by alerting policymakers and peace practitioners to emerging risks before they escalate into full-scale violence. By shifting the focus from reactive crisis management to preventive action, AI-enhanced early warning systems contribute to more timely, cost-effective, and sustainable peacebuilding strategies (UNESCO, 2021).

AI in Mediation and Negotiation

Beyond prediction, AI plays a growing role in mediation and negotiation processes, where complex stakeholder interests, power asymmetries, and information overload often hinder effective resolution. AI-powered decision-support systems assist mediators by modelling negotiation scenarios, analysing stakeholder preferences, identifying potential trade-offs, and proposing mutually beneficial outcomes (Klein et al., 2019). Through simulation and optimisation techniques, these systems enable mediators to explore multiple negotiation pathways and assess the likely consequences of different strategies.

AI tools also help reduce cognitive bias and emotional influences that can affect human judgment in high-stakes negotiations. By providing data-driven insights and transparent analytical frameworks, AI enhances objectivity and fairness in mediation processes. While AI cannot replace the human elements of empathy, trust-building, and cultural sensitivity that are central to successful mediation, it can significantly augment human capacity by supporting evidence-based dialogue and informed compromise (O'Neil, 2016).

Peacekeeping and Post-Conflict Reconstruction

According to (Karlsrud & Rosen, 2019), in peacekeeping operations, AI has demonstrated considerable potential in enhancing operational effectiveness, civilian

protection, and situational awareness. Predictive analytics and geospatial AI tools are increasingly used to support patrol planning, risk assessment, and early detection of threats to civilian populations. By analysing historical incident data and real-time intelligence, AI systems can identify high-risk areas and optimise the deployment of peacekeeping personnel and resources.

In post-conflict settings, AI contributes to reconstruction and peace consolidation by supporting data-driven decision-making in areas such as infrastructure development, humanitarian aid distribution, and governance reform. AI tools can optimise resource allocation, monitor ceasefire compliance, and assist in the documentation and analysis of human rights violations for transitional justice mechanisms. These applications enhance transparency, accountability, and efficiency in post-conflict recovery processes, thereby reducing the likelihood of conflict relapses and supporting long-term stability (Buhaug, Rustad, Hegre, & Strand, 2020).

Social Media Analysis and Countering Hate Speech

The proliferation of digital communication platforms has transformed the dynamics of conflict, with social media often serving as a catalyst for misinformation, hate speech, and mobilisation toward violence. AI algorithms, particularly those based on natural language processing and sentiment analysis, are increasingly employed to detect hate speech, extremist narratives, and incitement to violence across online platforms (Benesch et al., 2016). By identifying inflammatory content at an early stage, AI systems enable rapid responses by platform moderators, civil society organisations, and security agencies.

These technologies play a crucial role in preventing online discourse from escalating into physical violence, particularly in contexts of ethnic, religious, or political tension. However, their effectiveness depends on careful calibration to local languages, cultural nuances, and contextual meanings, as well as robust safeguards to protect freedom of expression and prevent misuse. When responsibly implemented, AI-driven social media analysis represents a powerful tool for mitigating digital drivers of conflict and promoting peaceful communication (Cederman, & Weidmann, 2017).

Ethical, Legal, and Socio-Political Challenges

Despite its transformative potential, the application of Artificial Intelligence (AI) in conflict resolution raises profound ethical, legal, and socio-political challenges that demand careful scrutiny. While AI-driven tools promise enhanced efficiency, predictive accuracy, and decision support, their deployment in sensitive conflict and peacebuilding contexts carries significant risks if not governed by robust ethical frameworks and regulatory mechanisms. These challenges underscore the need to balance technological innovation with human rights protection, accountability, and social justice.

Ethical Challenges: Bias, Transparency, and Accountability

O'Neil (2016) asserted that one of the most pressing ethical concerns surrounding AI in conflict resolution is algorithmic bias. AI systems are inherently shaped by the data on which they are trained, and when such data are incomplete, historically skewed, or reflective of structural inequalities, AI outputs may inadvertently reinforce existing power imbalances and social injustices. In conflict settings, biased predictions or analyses can lead to the misidentification of threat actors, the marginalisation of vulnerable groups, or the escalation of tensions through discriminatory interventions.

Closely related to the issue of bias is the problem of transparency and explainability. Many advanced AI models, particularly deep learning systems, operate as "black boxes," producing outputs that are difficult for users to interpret or challenge. In the context of peace negotiations, humanitarian interventions, or security operations, such opacity undermines trust, accountability, and informed decision-making. Stakeholders may be reluctant to rely on AI-generated recommendations if the underlying logic is unclear, especially when such recommendations carry life-altering consequences for affected populations. Consequently, there is a growing call for explainable and auditable AI systems that allow peace practitioners to understand, evaluate, and contest algorithmic decisions (Russell & Norvig, 2021).

Legal Challenges: Regulation, Responsibility, and International Norms

According to Klein, Faratin, Sayama and Bar-Yam (2019), the rapid deployment of AI technologies has outpaced the development of comprehensive legal frameworks governing their use in conflict resolution and peacebuilding. Existing international humanitarian law and human rights law were not designed to address the complexities introduced by autonomous systems, algorithmic decision-making, and large-scale surveillance technologies. As a result, questions surrounding responsibility, liability, and accountability remain unresolved, particularly when AI systems contribute to harmful outcomes.

The militarisation of AI further complicates these legal challenges. Autonomous weapons systems, predictive surveillance tools, and AI-enhanced intelligence platforms blur the line between conflict prevention and conflict escalation, raising serious concerns about compliance with international legal norms (UNESCO, 2021). The use of AI in military and security operations risks lowering the threshold for the use of force and diminishing human oversight in life-and-death decisions. These developments have prompted calls for international agreements and regulatory frameworks to govern the use of AI in conflict settings, including proposals for bans or strict limitations on fully autonomous weapons systems.

Socio-Political Challenges: Power, Trust, and Inclusion

Beyond ethical and legal considerations, the socio-political implications of AI deployment in conflict resolution are equally significant. AI technologies are often developed and controlled by powerful states, corporations, or international organisations, raising concerns about unequal access, digital colonialism, and the concentration of power. In fragile or conflict-affected societies, reliance on externally designed AI systems may undermine local ownership of peace processes and marginalise indigenous knowledge systems (Russell, & Norvig, 2021).

Moreover, the use of AI in surveillance, data collection, and social media monitoring can erode public trust if perceived as intrusive or coercive. Communities affected by conflict may view AI-driven interventions with suspicion, particularly in contexts where data governance is weak or where historical grievances against authorities persist. Without inclusive engagement and participatory design, AI tools risk exacerbating mistrust and resistance, thereby undermining the very peacebuilding objectives they seek to advance.

Toward Ethical and Responsible AI for Peace

Klein, Faratin, Sayama, & Bar-Yam (2019) noted that addressing these ethical, legal, and socio-political challenges requires a comprehensive and human-centered approach to AI governance in conflict resolution. Ethical guidelines must prioritise fairness, transparency, accountability, and respect for human dignity. Legal frameworks should be updated to clarify responsibility and establish enforceable standards for AI deployment in peace and security contexts. Equally important is the inclusion of local stakeholders, civil society, and affected communities in the design and implementation of AI systems, ensuring that technological solutions are contextually grounded and socially legitimate. Fundamentally, the responsible integration of AI into conflict resolution depends not only on technological sophistication but also on normative commitment to peace, justice, and human rights. Without such commitment, AI risks becoming a tool of control and escalation rather than a catalyst for sustainable peace.

Prospects and Policy Implications

The growing integration of Artificial Intelligence (AI) into conflict resolution and peacebuilding presents significant prospects for transforming how conflicts are anticipated, managed, and resolved. When deployed responsibly, AI has the potential to enhance early warning capabilities, improve decision-making accuracy, and support more inclusive and sustainable peace processes. However, realising these benefits requires a deliberate, holistic, and ethically grounded integration framework that aligns technological innovation with human values, institutional capacity, and socio-political realities.

At the policy level, governments and international stakeholders must prioritise transparency, accountability, and inclusiveness in AI governance. Transparent AI systems, whose data sources, decision logic, and limitations are clearly communicated, are essential for building trust among peace practitioners, affected communities, and policymakers. Accountability mechanisms must also be established to clarify responsibility for AI-assisted decisions, particularly in high-stakes contexts such as security interventions, humanitarian responses, and mediation processes. Without clear accountability, the legitimacy of AI-supported peace initiatives risks being undermined.

Capacity-building represents another critical policy priority. The effective use of AI in conflict resolution depends not only on technological availability but also on the digital literacy, analytical skills, and ethical awareness of peace practitioners. Policymakers should invest in targeted training programmes for diplomats, mediators, peacekeepers, and civil society actors to enable them to interpret AI-generated insights, recognise potential biases, and integrate technological tools into decision-making responsibly. Such initiatives are particularly important in conflict-affected and low-resource settings, where gaps in technical capacity may otherwise exacerbate existing inequalities in access to peacebuilding innovations.

Equally important is the need for context-sensitive and participatory approaches to AI deployment. Conflict dynamics are deeply embedded in local histories, cultures, and power relations, which cannot be fully captured by algorithmic models alone. AI systems used in conflict resolution must therefore be designed to incorporate local knowledge, qualitative insights, and the perspectives of affected communities. Participatory design processes that engage local stakeholders can help ensure that AI tools are socially legitimate, culturally appropriate, and responsive to on-the-ground realities, thereby avoiding technocratic solutions detached from lived experiences.

At the international level, collaboration among governments, multilateral organisations, academic institutions, and technology developers is essential for establishing shared ethical standards and regulatory frameworks. International organisations such as the United Nations, UNESCO, and regional bodies are well positioned to lead efforts in developing normative guidelines for the responsible use of AI in peace and security contexts. These frameworks should emphasise human rights protection, conflict sensitivity, data governance, and the primacy of human decision-making in peace processes. Coordinated international action can also help prevent the fragmented or unilateral use of AI technologies that may inadvertently escalate tensions or undermine global peace norms.

Looking ahead, AI offers promising prospects for advancing preventive diplomacy and sustainable peacebuilding. By enabling earlier detection of conflict risks, supporting evidence-based mediation, and enhancing post-conflict recovery efforts, AI can shift peacebuilding from reactive crisis management to proactive and adaptive

engagement. Nevertheless, these prospects can only be realised if AI is treated as a complementary tool rather than a substitute for human judgment, empathy, and political will.

In sum, the policy implications of AI in conflict resolution point toward the need for ethical governance, institutional capacity-building, inclusive participation, and international cooperation. When aligned with peacebuilding principles and grounded in respect for human dignity, AI can serve as a powerful catalyst for sustainable peace, helping societies move more effectively from prediction to prevention and from conflict to lasting reconciliation.

Recommendations

Based on the analysis of the role, applications, and challenges of Artificial Intelligence (AI) in conflict resolution, the following recommendations are proposed to guide policymakers, peace practitioners, international organisations, and researchers toward the responsible and effective integration of AI for sustainable peacebuilding.

1. Governments and international bodies should prioritise the development of comprehensive ethical and legal frameworks to govern the use of AI in conflict resolution and peacebuilding. These frameworks should emphasise transparency, accountability, fairness, and respect for human rights, while clearly defining responsibility and liability for AI-assisted decisions. International cooperation is essential to establish shared norms and standards, particularly to regulate the use of AI in security, surveillance, and military applications to prevent misuse and escalation of conflict.
2. AI systems deployed in conflict resolution should be designed to support, rather than replace, human judgment. Emphasis should be placed on human-centered and explainable AI models that allow peace practitioners to understand, interpret, and challenge algorithmic outputs. Such transparency is critical for building trust among stakeholders and ensuring that AI-informed decisions remain ethically grounded and contextually appropriate.
3. Targeted capacity-building initiatives should be implemented to equip diplomats, mediators, peacekeepers, humanitarian workers, and civil society actors with the digital literacy and ethical competence required to use AI tools effectively. Training programmes should focus not only on technical skills but also on critical awareness of algorithmic bias, data limitations, and ethical risks. Special attention should be given to building local capacity in conflict-affected and developing regions to prevent widening digital and peacebuilding inequalities.
4. AI applications in conflict resolution must be context-sensitive and grounded in local realities. Policymakers and technology developers should adopt participatory approaches that involve local communities, traditional leaders,

and civil society organisations in the design, implementation, and evaluation of AI tools. Integrating local knowledge and qualitative insights will enhance the relevance, legitimacy, and effectiveness of AI-supported peace interventions.

5. Effective AI-driven conflict resolution requires collaboration among governments, international organisations, academic institutions, technology developers, and peacebuilding practitioners. Interdisciplinary partnerships should be encouraged to bridge the gap between technical innovation and peace practice, ensuring that AI tools are informed by conflict theory, ethics, and social science research. International organisations such as the United Nations and UNESCO should continue to play a coordinating role in knowledge-sharing and norm-setting.
6. Reliable and ethically sourced data are fundamental to effective AI applications. Policymakers should invest in secure data infrastructure, data protection mechanisms, and responsible data governance practices that safeguard privacy and prevent misuse. Clear guidelines should be established for data collection, storage, and sharing in conflict-affected environments, where data vulnerabilities and risks are particularly acute.
7. Continuous research and evaluation are necessary to assess the long-term impacts of AI in conflict resolution. Academic institutions and research organisations should be supported to conduct empirical studies, develop context-specific models, and monitor unintended consequences of AI deployment. Regular evaluation will help refine AI tools, improve accountability, and ensure that technological interventions contribute meaningfully to sustainable peace.

Conclusion

From prediction to peace, Artificial Intelligence (AI) presents transformative possibilities for reimagining conflict resolution in an increasingly complex and interconnected world. By enabling proactive, data-driven, and adaptive interventions, AI expands the capacity of peacebuilders to anticipate conflict dynamics, respond strategically to emerging threats, and support more informed and inclusive decision-making processes. Its applications across conflict prediction, mediation, peacekeeping, and post-conflict reconstruction demonstrate that AI can play a meaningful role throughout the entire conflict cycle, shifting peacebuilding efforts from reactive crisis management toward preventive and sustainable engagement.

Nevertheless, AI is not a panacea for conflict. The deep human dimensions of peace, empathy, trust, moral reasoning, cultural sensitivity, and political judgment, remain beyond the reach of algorithms and computational systems. AI therefore cannot replace human judgment, diplomacy, or ethical responsibility; rather, its value lies in

augmenting human capacity and enhancing the effectiveness of traditional conflict resolution mechanisms. Without careful governance, AI risks reinforcing existing inequalities, undermining accountability, and exacerbating socio-political tensions, particularly in fragile and conflict-affected settings.

Addressing the ethical, legal, and socio-political challenges associated with AI deployment is thus imperative. Issues of algorithmic bias, transparency, accountability, and militarisation must be confronted through robust ethical frameworks, inclusive policy design, and international regulatory cooperation. Equally important is the need to embed AI within human-centered and context-sensitive peacebuilding practices that prioritise local knowledge, community participation, and respect for human rights.

Ultimately, the future of AI in conflict resolution depends on achieving a balanced and principled partnership between technological innovation and human-centered peace practice. When guided by ethical governance and aligned with the core values of peace, justice, and inclusivity, AI has the potential to serve not merely as a tool for prediction, but as a catalyst for lasting peace and reconciliation in the 21st century.

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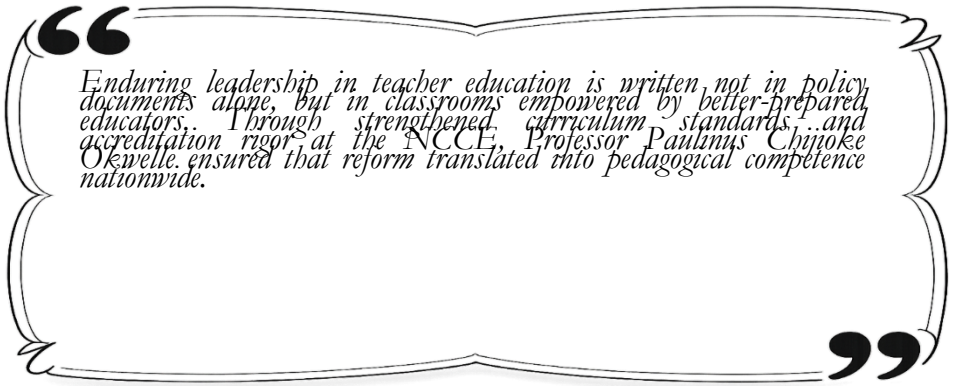
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Chapter 47

Artificial Intelligence and Minority Languages: Challenges and Prospects for Multilingual Inclusion

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Abstract

Artificial Intelligence (AI) is rapidly transforming communication, education, governance, and economic systems worldwide. However, the benefits of AI technologies are unevenly distributed across languages, with dominant global languages, particularly English, receiving disproportionate attention. Minority and under-resourced languages remain largely excluded from AI development, creating a new form of digital and linguistic inequality. This paper critically examines the intersection of Artificial Intelligence and minority languages, focusing on the challenges hindering their inclusion and the prospects for achieving multilingual equity in the digital age. Drawing from global experiences and contextualizing the discussion within Africa and other multilingual societies, the paper argues that inclusive AI development is essential for cultural preservation, social justice, educational access, and sustainable development. It concludes by proposing policy, technological, and educational strategies for promoting AI-driven multilingual inclusion.

Keywords: *Artificial Intelligence, Minority Languages, Multilingualism, Linguistic Diversity, Language Technology*

Introduction

Language is foundational to human identity, cultural continuity, and meaningful social participation. Beyond its instrumental role as a medium of communication, language embodies collective histories, value systems, epistemologies, and indigenous knowledge traditions that shape how communities interpret and engage with the world (Fishman, 1991; UNESCO, 2003). In multilingual societies, minority

and indigenous languages are especially vital, as they function as carriers of oral heritage, intergenerational memory, and culturally embedded ways of knowing. Their continued use strengthens social cohesion, affirms cultural autonomy, and safeguards linguistic diversity against homogenizing global forces (May, 2012; Skutnabb-Kangas, 2000).

The rapid advancement of Artificial Intelligence (AI)—particularly in domains such as machine translation, automatic speech recognition, conversational agents, and natural language processing (NLP)—has positioned language at the core of human–machine interaction (Jurafsky & Martin, 2023). Increasingly, AI-driven language technologies mediate access to education, public administration, healthcare delivery, commerce, and social services, thereby shaping participation in what is now a deeply digital public sphere (Floridi et al., 2018). In theory, these technologies possess transformative potential to democratize knowledge, lower communication barriers, and promote social inclusion across linguistic and cultural boundaries (Bender et al., 2021).

In practice, however, the development and deployment of AI systems remain heavily skewed toward a narrow set of globally dominant, high-resource languages—most notably English and a small number of European and East Asian languages (Joshi et al., 2020). This linguistic concentration reflects broader structural inequalities in data availability, research funding, technological infrastructure, and geopolitical power relations within the global AI ecosystem (Birhane et al., 2022). Consequently, many minority and indigenous languages remain underrepresented or entirely absent in AI-enabled platforms, leading to their digital invisibility. For speakers of these languages, the lack of AI support can result in exclusion from digital education, limited access to e-governance and public information systems, reduced healthcare communication, and constrained participation in the rapidly expanding digital economy (UNESCO, 2021).

Beyond technical and infrastructural challenges, the marginalization of minority languages in AI systems raises profound socio-political and ethical concerns. Language-based digital exclusion risks reinforcing existing social inequalities, eroding linguistic human rights, and perpetuating cultural and epistemic domination by globally powerful languages (Skutnabb-Kangas & Phillipson, 2010). Moreover, AI systems trained predominantly on dominant linguistic and cultural norms may reproduce biases that misrepresent or silence minority worldviews, further deepening digital and social divides (Zuboff, 2019).

At the same time, AI also presents unprecedented opportunities for reversing long-standing patterns of linguistic marginalization. Emerging research demonstrates that AI can support language documentation, revitalization, and preservation efforts, particularly for low-resource and endangered languages (Bird, 2020). Advances in transfer learning, multilingual models, and community-driven data curation offer

promising pathways for developing culturally responsive AI systems that reflect local linguistic realities (De Pauw et al., 2011). When guided by inclusive policies, ethical frameworks, and meaningful community participation, AI technologies can contribute to culturally relevant education, inclusive governance, and the long-term sustainability of linguistic diversity.

Against this backdrop, this paper critically examines the implications of AI for minority languages by interrogating the structural, technical, and socio-political barriers that constrain their meaningful inclusion in contemporary AI development. It further explores emerging innovations, policy interventions, and community-led initiatives that illustrate how AI can be strategically leveraged to protect linguistic rights, empower marginalized language communities, and promote more equitable, inclusive, and culturally sustainable digital futures.

Artificial Intelligence and Language Technologies

Artificial Intelligence (AI) refers to computational systems designed to perform tasks that ordinarily require human intelligence, including learning, reasoning, perception, and language understanding (Russell & Norvig, 2021). In the linguistic domain, AI has given rise to a wide range of language technologies that enable machines to process, generate, and interpret human language in both spoken and written forms. These technologies have become central to contemporary digital communication and human–computer interaction.

Key AI-driven language applications include automatic speech recognition (ASR), which enables systems to convert spoken language into text; machine translation (MT), which facilitates cross-linguistic communication; text-to-speech and speech-to-text systems that enhance accessibility; conversational agents and chatbots that simulate human dialogue; and language modeling techniques used for tasks such as sentiment analysis, text summarization, and information retrieval (Jurafsky & Martin, 2023). Collectively, these technologies underpin critical digital infrastructures across sectors such as education, healthcare, governance, customer service, and social media.

The effectiveness of AI language technologies depends largely on the availability of large, high-quality datasets, substantial computational resources, and sophisticated algorithmic training methods, particularly those based on deep learning (Goodfellow et al., 2016). However, this data-intensive nature of AI development has significant implications for linguistic equity. Languages with extensive digital corpora and institutional support—often referred to as high-resource languages—benefit disproportionately from advances in AI, while low-resource and minority languages remain underrepresented or excluded (Joshi et al., 2020). This imbalance raises concerns about fairness, inclusivity, and the long-term sustainability of linguistic diversity in an increasingly AI-mediated world.

Minority Languages

Minority languages are generally defined as languages spoken by numerically smaller populations or by groups that are politically, economically, or socially less dominant within a given society (May, 2012). These languages often exist in asymmetrical power relations with dominant or official languages and typically lack strong institutional backing, standardized orthographies, robust literary traditions, and sustained representation in formal education, governance, and media (Skutnabb-Kangas, 2000).

In many contexts, minority languages also suffer from limited digital presence, scarce linguistic documentation, and inadequate technological resources, factors that significantly constrain their integration into AI systems (UNESCO, 2003). In Africa alone, the continent is home to over 2,000 indigenous languages, many of which are classified as endangered or vulnerable due to language shift, globalization, urbanization, and the dominance of colonial or national languages (UNESCO, 2021). Similar patterns are observable in parts of Asia, Latin America, and indigenous communities worldwide.

The marginal status of minority languages has far-reaching consequences beyond communication. Language loss often entails the erosion of indigenous knowledge systems, oral histories, cultural practices, and locally grounded epistemologies (Fishman, 1991). In the context of AI, the exclusion of minority languages from language technologies risks deepening existing digital divides, limiting access to AI-enabled services, and reinforcing linguistic hierarchies in the digital sphere (Birhane et al., 2022).

Nevertheless, growing scholarly and policy attention highlights the potential of AI to support minority languages through documentation, revitalization, and increased visibility—provided that development efforts are guided by inclusive design principles, ethical considerations, and meaningful community participation (Bird, 2020). Understanding the nature, challenges, and sociopolitical positioning of minority languages is therefore essential for advancing more equitable and culturally responsive AI ecosystems.

Challenges of AI Development for Minority Languages

Data Scarcity and Resource Limitations

One of the most significant obstacles to the development of AI systems for minority languages is the acute scarcity of high-quality linguistic data. Contemporary AI models, particularly those based on machine learning and deep learning architectures, require vast quantities of digitized, structured, and annotated data to achieve reliable performance (Goodfellow et al., 2016; Jurafsky & Martin, 2023). However, many minority languages lack fundamental digital resources such as

extensive text corpora, annotated datasets, speech recordings, pronunciation lexicons, and morphological databases.

This data deficit stems from historical marginalization, limited documentation efforts, and the absence of sustained institutional investment in language preservation and digitization (Bird, 2020). As a result, AI models trained on insufficient or unbalanced data often exhibit high error rates, reduced robustness, and limited generalizability, rendering them ineffective or entirely excluding minority languages from AI-enabled platforms (Joshi et al., 2020). The consequence is a widening digital gap in which speakers of minority languages are systematically underserved by emerging language technologies.

Linguistic Complexity and Diversity

Many minority and indigenous languages display rich linguistic features, including complex morphological systems, extensive inflection, tonal contrasts, agglutination, and significant dialectal variation (Comrie, 2013). Such characteristics pose substantial challenges for AI development, particularly when prevailing computational models are optimized for Indo-European languages with relatively simpler morphosyntactic structures and abundant training data.

For instance, tonal distinctions common in many African and Asian languages can drastically alter meaning, yet they are often poorly captured by speech recognition and text-to-speech systems (De Pauw et al., 2011). Similarly, dialectal diversity within a single language community complicates standardization and data collection efforts, increasing the difficulty of building models that accurately reflect authentic language use. These challenges underscore the limitations of one-size-fits-all AI architectures and highlight the need for linguistically informed and context-sensitive design approaches.

Economic and Market-Driven Bias

The global AI industry is predominantly shaped by market-driven logics that prioritize profitability, scalability, and return on investment. Consequently, technology firms tend to focus on languages with large speaker populations, strong purchasing power, and global commercial relevance (Zuboff, 2019). Minority languages, particularly those spoken in economically marginalized regions, are often perceived as "low-value" and therefore receive little attention in AI research and development pipelines. This market bias reinforces existing linguistic hierarchies and contributes to the systematic neglect of minority languages in digital innovation (Birhane et al., 2022). In doing so, it perpetuates a cycle in which economic marginalization translates into technological exclusion, further entrenching global inequalities in access to AI-enabled services and opportunities.

Algorithmic Bias and Linguistic Inequality

AI systems trained primarily on dominant languages and cultures are prone to reproducing linguistic, cultural, and epistemic biases embedded in their training data (Bender et al., 2021). For minority languages, this often results in inaccurate translations, semantic distortions, misclassification of speech or text, and the erasure of culturally specific meanings and pragmatic nuances.

Such algorithmic bias not only undermines the functional accuracy of AI applications but also poses ethical risks by misrepresenting minority communities and reinforcing stereotypes (Floridi et al., 2018). In extreme cases, biased AI systems may delegitimize minority languages as "noisy," "unstructured," or "non-standard," thereby contributing to their symbolic and practical marginalization in digital spaces.

Weak Policy and Institutional Support

In many developing countries, including Nigeria, national language and technology policies continue to prioritize major or colonial languages in formal education, governance, and digital innovation (May, 2012). Indigenous and minority languages are frequently relegated to informal domains, with limited institutional backing for their integration into technological development.

The absence of coherent policy frameworks, funding mechanisms, and institutional coordination for incorporating minority languages into AI initiatives further exacerbates their exclusion (UNESCO, 2021). Without deliberate government intervention, regulatory guidance, and cross-sector collaboration, AI development risks reinforcing existing linguistic inequalities rather than addressing them. Strengthening policy and institutional support is therefore essential for ensuring that AI contributes to linguistic inclusion, cultural sustainability, and social equity.

Prospects of AI for Minority Language Inclusion

Despite the significant challenges confronting the integration of minority languages into AI systems, emerging evidence suggests that Artificial Intelligence holds immense potential to advance multilingual inclusion when its design and implementation are guided by intentional, ethical, and context-sensitive frameworks (Bird, 2020; UNESCO, 2021). Rather than reinforcing existing linguistic hierarchies, AI can be harnessed as a transformative tool for linguistic empowerment, cultural sustainability, and social inclusion.

Language Preservation and Revitalization

AI technologies offer powerful mechanisms for the documentation, preservation, and revitalization of endangered and minority languages. Automated speech recognition and transcription tools can be employed to record oral histories, folktales, songs, and indigenous knowledge narratives, thereby converting ephemeral oral traditions into

durable digital archives (Bird, 2020). Similarly, AI-supported digital dictionaries, annotated corpora, and lexicographic tools can facilitate systematic language documentation and scholarly research.

Advances in text-to-speech and speech synthesis technologies also hold promise for language revitalization efforts, particularly in supporting language learning, pronunciation modeling, and intergenerational transmission (De Pauw et al., 2011). By enabling minority languages to exist and function within digital ecosystems, AI contributes to their visibility, legitimacy, and long-term survival.

Inclusive Education and Literacy Development

AI-powered educational technologies present significant opportunities for improving access to quality education for speakers of minority languages. Personalized learning platforms, intelligent tutoring systems, and adaptive educational applications can deliver instructional content in learners' mother tongues, thereby enhancing comprehension, cognitive engagement, and knowledge retention (UNESCO, 2003; May, 2012).

Extensive research supports the effectiveness of mother-tongue-based education, particularly at early and foundational levels, in fostering literacy development and academic success (Skutnabb-Kangas, 2000). By integrating minority languages into AI-driven educational tools, education systems can reduce learning barriers, address inequities, and promote culturally responsive pedagogy. Such approaches are especially relevant in linguistically diverse societies where dominant-language instruction often disadvantages minority learners.

Enhanced Access to Public Services

Multilingual AI systems have the potential to significantly improve access to essential public services, including healthcare, legal assistance, social welfare, and governance. AI-driven chatbots, voice assistants, and translation tools can facilitate communication between service providers and citizens by enabling interactions in indigenous and minority languages (Floridi et al., 2018).

This prospect is particularly salient for rural and marginalized communities, where language barriers frequently limit access to critical information and services. In healthcare settings, for example, AI-enabled language tools can enhance patient-provider communication, improve health literacy, and support informed decision-making. In governance, multilingual AI can promote transparency, civic participation, and trust by making public information accessible to linguistically diverse populations (UNESCO, 2021).

Community-Driven AI Development

An important pathway toward inclusive AI lies in community-driven and participatory development models. Open-source AI initiatives and collaborative data-creation frameworks allow native speakers, linguists, and local communities to actively contribute linguistic data, cultural knowledge, and contextual expertise (Bird, 2020). Such participatory approaches challenge market-driven paradigms that prioritize dominant languages and instead foreground cultural authenticity, social relevance, and ethical responsibility.

When minority language speakers are positioned as co-creators rather than passive users of AI systems, the resulting technologies are more likely to reflect local communicative norms, pragmatic meanings, and cultural values. This shift aligns with broader calls for decolonial and justice-oriented approaches to AI development that center marginalized voices (Birhane et al., 2022).

African and Global Initiatives

Across Africa and other parts of the Global South, a growing number of initiatives demonstrate increasing recognition of the importance of linguistic inclusion in AI development. These include localized language technology hubs, university-led natural language processing (NLP) research groups, and collaborative partnerships involving governments, international organizations, and technology companies (UNESCO, 2021).

In the African context, efforts to develop AI tools for indigenous languages—such as localized speech recognition systems, translation platforms, and educational applications—signal a gradual shift toward more inclusive digital ecosystems. While still limited in scale, these initiatives illustrate the feasibility of integrating minority languages into AI systems when supported by sustained investment, policy alignment, and cross-sector collaboration.

Implications for Multilingual Societies

For multilingual nations such as Nigeria, the exclusion of minority languages from AI systems poses serious risks to cultural sustainability, social equity, and inclusive national development. Language marginalization in digital technologies can exacerbate existing educational disparities, weaken indigenous knowledge systems, and limit equitable participation in the digital economy (May, 2012; UNESCO, 2021).

Conversely, inclusive AI policies that recognize and integrate linguistic diversity can yield far-reaching benefits. Such policies can promote national unity through symbolic and practical recognition of diverse linguistic identities, support the preservation and transmission of indigenous knowledge, and expand economic

opportunities by enabling broader participation in AI-enabled industries and services. Moreover, inclusive AI can contribute to reducing educational and social inequalities by ensuring that digital innovations serve all linguistic communities, not only dominant language groups.

AI should therefore be understood not merely as a neutral technological instrument but as a socio-cultural force with profound implications for language rights, identity, and power relations. The choices made in AI design, policy, and governance will play a decisive role in determining whether AI accelerates linguistic homogenization or fosters a more inclusive, multilingual digital future.

Strategies for Promoting AI-Driven Multilingual Inclusion

Realizing the inclusive potential of Artificial Intelligence for minority languages requires deliberate, coordinated, and sustained interventions across policy, infrastructure, research, and ethics. Without intentional strategies, AI systems risk perpetuating existing linguistic inequalities rather than mitigating them. The following approaches are essential for fostering AI-driven multilingual inclusion.

Policy Reform and Governance Frameworks

Governments play a pivotal role in shaping the linguistic orientation of digital innovation. Inclusive language and digital governance policies should explicitly prioritize the integration of indigenous and minority languages into AI and information and communication technology (ICT) development (May, 2012; UNESCO, 2021). Such policies must move beyond symbolic recognition to actionable commitments, including funding incentives, regulatory guidelines, and national AI strategies that foreground linguistic diversity.

In multilingual societies like Nigeria, aligning language policy with national digital transformation agendas can promote equity, strengthen cultural identity, and ensure that AI technologies serve diverse linguistic communities. Policy coherence across education, technology, and cultural sectors is therefore critical to sustainable multilingual inclusion.

Investment in Data Infrastructure

The availability of high-quality linguistic data is foundational to AI development. Both public and private sector actors must invest in the creation, digitization, and maintenance of open, annotated datasets for minority languages, including text corpora, speech recordings, lexicons, and parallel translation resources (Joshi et al., 2020; Bird, 2020).

Open-data initiatives and public–private partnerships can play a transformative role by lowering entry barriers for researchers and developers while ensuring that minority language resources are accessible and reusable. Such investments not only

enhance AI performance but also contribute to long-term language documentation and preservation efforts.

Interdisciplinary and Community-Centered Collaboration

Effective AI systems for minority languages require collaboration across disciplinary and social boundaries. Linguists, educators, computer scientists, sociologists, and policymakers must work alongside native speakers and local communities throughout the AI design and development process (De Pauw et al., 2011). This interdisciplinary and participatory approach ensures that AI technologies are linguistically accurate, culturally authentic, and socially relevant.

Community-centered collaboration challenges extractive models of data collection by recognizing minority language speakers as knowledge holders and co-creators rather than passive data sources. Such engagement enhances trust, sustainability, and ethical accountability in AI development.

Capacity Building and Human Capital Development

Building local capacity in language technology is essential for sustaining AI-driven multilingual inclusion. Targeted training programs, academic curricula, and research fellowships should equip local researchers, educators, and developers with skills in computational linguistics, natural language processing, and AI ethics (UNESCO, 2021).

In regions such as Africa, strengthening institutional capacity within universities and research centers can reduce reliance on external technologies and foster locally grounded innovation. Empowering local experts also ensures that AI solutions are responsive to contextual linguistic realities and development priorities.

Ethical and Inclusive AI Design

Ethical considerations must be central to AI systems designed for multilingual contexts. Developers should actively address algorithmic bias, linguistic misrepresentation, and cultural insensitivity by adopting fairness-aware models, inclusive evaluation metrics, and transparent design processes (Bender et al., 2021; Floridi et al., 2018).

Inclusive AI design entails recognizing language as a carrier of identity and power, not merely a technical input. By embedding ethical principles such as fairness, accountability, and cultural respect into AI development, stakeholders can ensure that language technologies promote dignity, equity, and linguistic justice rather than reinforcing exclusion.

Synthesis

Collectively, these strategies underscore the need for a holistic approach to AI-driven multilingual inclusion—one that integrates policy reform, infrastructural investment, interdisciplinary collaboration, capacity building, and ethical governance. When implemented coherently, such strategies can reposition AI as a catalyst for linguistic empowerment, cultural sustainability, and inclusive digital development.

Conclusion

Artificial Intelligence represents both a significant challenge and a transformative opportunity for minority languages. On one hand, current AI systems—designed predominantly around high-resource, globally dominant languages—risk exacerbating linguistic inequality, marginalizing speakers of indigenous languages, and accelerating the erosion of cultural and epistemic diversity (Joshi et al., 2020; Birhane et al., 2022). On the other hand, when intentionally designed, ethically governed, and supported by inclusive policies, AI has the potential to become a powerful instrument for linguistic empowerment, cultural preservation, and social inclusion (Bird, 2020; UNESCO, 2021).

Ensuring multilingual inclusion in AI development is not solely a technical challenge; it is a moral, socio-political, and policy imperative. Integrating minority languages into AI systems requires coordinated efforts encompassing policy reform, investment in data infrastructure, interdisciplinary collaboration, capacity building, and culturally sensitive design. Such strategies not only enhance AI performance but also safeguard linguistic heritage, support mother-tongue-based education, and strengthen equitable participation in the digital economy (May, 2012; Skutnabb-Kangas, 2000; Floridi et al., 2018).

As societies increasingly rely on intelligent technologies, the survival, visibility, and relevance of minority languages will depend on deliberate, sustained efforts to embed them into the digital future. By prioritizing linguistic diversity and inclusivity, policymakers, researchers, developers, and communities can harness AI not only as a technological innovation but as a socio-cultural instrument that promotes justice, equity, and sustainable multilingual development. In doing so, AI can move beyond its current role as a tool for efficiency and profit to become a catalyst for cultural resilience and digital empowerment in multilingual societies.

Recommendations

Building on the analysis of the challenges and opportunities posed by Artificial Intelligence (AI) for minority languages, the following recommendations provide a comprehensive roadmap for policymakers, researchers, technology developers, and community stakeholders. These strategies are designed to ensure that AI functions

not merely as a technological innovation but as a catalyst for linguistic empowerment, cultural preservation, social inclusion, and equitable digital development, rather than reinforcing existing linguistic hierarchies and digital inequalities.

1. **Policy and Regulatory Reform:** Inclusive and forward-looking language and digital policies are essential for ensuring that minority languages are fully integrated into AI ecosystems. Governments and regulatory bodies should develop national AI and digital strategies that explicitly incorporate linguistic diversity and cultural sustainability objectives. Regulatory and financial incentives, including grants, tax relief, procurement policies, or subsidies for AI initiatives that prioritize low-resource and endangered languages, should be provided. Furthermore, the integration of indigenous languages into public digital services, including e-governance platforms, health information systems, digital libraries, and educational technologies, should be mandated. Legal frameworks must also be enacted to protect the linguistic rights of minority communities in the digital sphere, ensuring equitable access to information and services. Regional and international policy alignment can facilitate cross-border collaboration and the sharing of best practices. By institutionalising linguistic inclusion in policy and governance, governments signal commitment to equity, accountability, and social justice, while creating an enabling environment for AI innovation that serves all language communities (Eyisi, J. & Olatunji, 2023).

2. **Investment in Data Infrastructure:** High-quality linguistic data constitutes the foundation for AI systems capable of supporting minority languages. To address the persistent scarcity of data, governments, private sector actors, and research institutions should fund the creation of open, annotated, and digitized corpora, including text, audio, and multimodal datasets, for low-resource languages. Parallel corpora, lexical databases, and pronunciation resources should also be developed to support machine translation, speech recognition, and AI-driven educational and civic tools. The digital archiving of oral histories, folklore, and indigenous knowledge is crucial to preserve linguistic heritage and enhance model training. Public–private partnerships should be facilitated to combine technological infrastructure, expertise, and funding for large-scale data collection and maintenance. All datasets should adhere to ethical standards, including informed consent, data privacy, and community ownership. Strategic investment in linguistic infrastructure ensures that AI models accurately reflect the complexity, richness, and diversity of minority languages.

3. **Interdisciplinary and Participatory Collaboration:** The development of AI systems for minority languages requires interdisciplinary and

participatory approaches, integrating expertise from linguistics, education, computer science, sociology, and local communities (De Pauw et al., 2011). Native speakers should be actively involved as co-creators in data collection, annotation, model evaluation, and deployment. Educators, cultural practitioners, and community leaders must collaborate to ensure AI solutions are culturally appropriate, pedagogically sound, and contextually relevant. Interdisciplinary research centers that bring together computational linguistics, AI engineering, and sociolinguistics should be established to develop locally grounded technologies. Community-based participatory approaches must be promoted to prioritize the voices, knowledge, and needs of minority language speakers. Such collaboration enhances social legitimacy, usability, and ethical grounding while fostering sustainable engagement between technology developers and language communities.

4. **Capacity Building and Human Capital Development:** Sustainable AI-driven multilingual inclusion requires investment in human capital. Governments, universities, and development partners should offer training programs, workshops, and fellowships in natural language processing (NLP), computational linguistics, AI ethics, and language technology development. Language technology modules should be integrated into higher education curricula to equip future researchers and developers with the skills necessary for low-resource language AI. Local start-ups, research labs, and innovation hubs focusing on indigenous language solutions should be encouraged and supported. Additionally, local communities should be trained in data collection, annotation, and model evaluation, enabling them to participate actively in AI development. Strengthening local capacity reduces reliance on imported technologies and ensures that AI solutions are linguistically and culturally grounded.

5. **Ethical and Inclusive AI Design:** AI systems must be designed with fairness, transparency, and cultural sensitivity to avoid reproducing linguistic and social inequalities. Algorithmic audits and fairness assessments tailored to minority language contexts should be conducted regularly. Semantic fidelity and cultural accuracy must be ensured in translation, speech recognition, and conversational AI systems. Linguistic diversity and social inclusion should be incorporated as core performance metrics alongside technical efficiency. Ethical guidelines, accountability frameworks, and community oversight mechanisms should be established to protect the rights and identities of minority language speakers. By embedding ethical principles into AI design, stakeholders ensure that technology contributes to justice, inclusion, and the protection of cultural heritage.

6. **Community Engagement and Advocacy.** Active community participation is central to sustaining minority languages in AI ecosystems. Crowdsourcing and citizen science projects can be leveraged to collect, annotate, and validate linguistic data from native speakers. Awareness campaigns highlighting the value of minority languages in digital spaces and AI technologies should be implemented. Civil society organisations, cultural institutions, and local language associations must be supported to act as intermediaries between technology developers and communities. Furthermore, local governance and advocacy efforts should be encouraged to influence policy, resource allocation, and technological innovation in favour of linguistic inclusion. Community engagement fosters ownership, cultural authenticity, and long-term sustainability in AI-driven language initiatives (Olatunji, & Akinsulire, 2022).

7. **Research and Innovation Support:** Sustained research and innovation are critical to overcoming technical barriers and promoting low-resource language AI. Funding and institutional support should prioritise the development of low-resource machine translation models and AI systems optimised for tonal, agglutinative, and morphologically complex languages. Innovations in speech recognition, text-to-speech, and speech synthesis for indigenous languages should be encouraged. AI applications that support mother-tongue literacy, education, and access to public services should be developed and scaled. Collaborative international research networks should be promoted to facilitate knowledge sharing, resource pooling, and adoption of best practices. Such targeted investment in research ensures that AI solutions remain cutting-edge, inclusive, and responsive to the real needs of minority language communities.

Synthesis: Implementing these strategies requires a coordinated, multi-stakeholder approach that integrates policy, technology, research, and community action. When executed systematically, these recommendations can transform AI from a tool that risks reinforcing linguistic inequality into a driver of cultural preservation, educational inclusion, economic empowerment, and social equity. By foregrounding linguistic diversity in AI development, nations can ensure that minority languages not only survive but thrive in the digital era, fostering equitable, sustainable, and multilingual societies. The deliberate integration of minority languages into AI systems is therefore not only a technological priority but also a moral, socio-cultural, and policy imperative in our increasingly digital and interconnected world.

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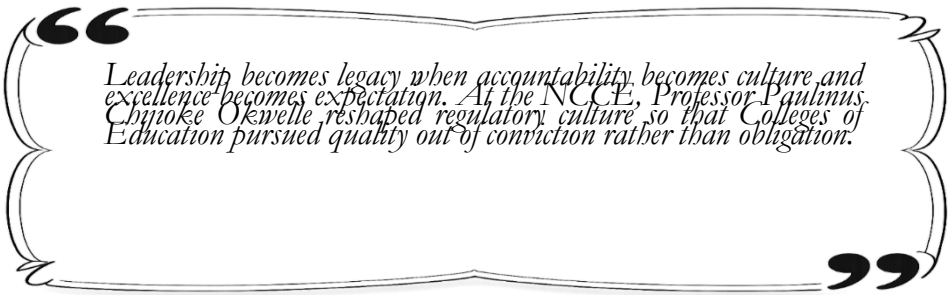
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Chapter 48

Preparedness To Integrate Artificial Intelligence into Teaching and Learning in Technical Education Programmes in Tertiary Institutions in Rivers State

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Abstract

This study examined the Preparedness to Integrate Artificial Intelligence into Teaching and Learning in Technical Education Programs in Tertiary Institutions in Rivers State. Specifically, the study Assess the current preparedness of TVET institutions in Rivers State regarding the availability of resources for integrating AI-related technical concepts, examine the AI competencies required by TVET teachers in Rivers State to effectively deliver instruction relevant to future workforce demands and examine the potential relationship between the successful integration of AI-related TVET and the measured performance and perceived workforce readiness of TVET students in Rivers State. Three research questions where formulated to guide the study. A descriptive survey research design was adopted for the study. The population comprised all academic staff and administrative staff (HODs, Departmental ICT coordinators) from the three tertiary institutions offering TVET in Rivers State. Data were collected using a structured questionnaire developed on a five-point Likert scale. Data were analyzed using mean and standard deviation. Findings revealed that the availability of AI-related instructional resources in TVET institutions was inadequate, and significant competency gaps existed among TVET teachers regarding AI-based pedagogy. However, the integration of AI-related technical modules was perceived to have a positive and

significant influence on students' technical competence, adaptability, and readiness for future workforce demands. The study concluded that effective integration of AI into TVET is essential for enhancing workforce readiness in Rivers State. It therefore recommends strategic investment in AI infrastructure, training programs for TVET teachers, and curriculum reforms that embed AI competencies within TVET frameworks.

Keywords: *Integration, Artificial Intelligence, Technical Education, Teaching and Learning, Tertiary Institutions.*

Introduction

The global environment is undergoing rapid digital transformation, driven significantly by Artificial Intelligence (AI) (Okhrimenko, Pulina. & Sobko, (2025), (Cherep, Kaliuzhna, Markova. Riga, and Latvia 2025). Sun, Li, & Ren, (2019), defined AI as the theory and development of computer systems capable of performing tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. Fundamentally, AI systems are artificially created intelligence imitated and implemented by artificial means, distinguishing them from natural intelligence. The ability of machines to learn, perceive, think, understand, recognize, judge, reason, plan, and solve problems defines the capability of AI. Key elements necessary for AI development include knowledge, data, algorithms, and computing power (Cai, Liu, Cai, & Chen. (2020).

According to Cherep, (2025). AI is already transforming industries globally, being described as the "steam engine of the mind" set to revolutionize skills in communication, reasoning, analytics, sales, and marketing. Applications range widely across sectors such as healthcare, finance, industry, transportation, business, and education. For instance, AI is integral to automating logistics, predicting market trends, generating personalized marketing content, and improving quality control in production. The development of artificial intelligence in China is relatively late, but the development speed is fast. The application of artificial intelligence in China is mainly concentrated in three fields, namely interface design, data search and main system. At present, people have very high attention in interface design, and develop intelligent interface technology, which can greatly improve the convenience and effectiveness of artificial intelligence communication, extract effective information from a large amount of fuzzy data information and have corresponding value information. The application of computer intelligence is mainly to imitate the intelligence of human brain to complete various functions. In the future, the application of artificial intelligence in artificial neural network will be more popular, and it has the potential for super development. In the process of development, artificial intelligence is not only optimized and improved, but also can further

influence the human lifestyle and production mode, laying a good foundation for the overall information development (Wenhui, Cuimin, Ripeng, 2019). This accelerating integration of AI necessitates a corresponding shift in workforce skills in different fields including Technical, Vocational Education and training.

Technical and Vocational Education and Training (TVET) according to Makinde, and Bamiro, (2022) plays a crucial role in providing educational opportunities for career advancement, developing skilled human resources, and ensuring sustainable development of countries. TVET is generally centered on applied skills rather than academic knowledge, focusing on practical application rather than theory. The workforce demands in the 21st century emphasize key skills, including technical, problem-solving, teamwork, communication, and crucially, digital skills **(**Shahbazi, & Ahmady, 2022). Digital skill is defined as the basic understanding of how to interact with a computer, how to interact with applications on that computer, and the ability to locate, organize, understand, evaluate, and create information using digital technology (Jadas, Amasa, & Ikara, 2023).

However, technical education in Nigeria faces systemic challenges, including inadequate budgetary provisions, staff shortages, obsolete equipment, low quality training programs, and curricula focused too much on theory rather than modern practices. Specifically, studies in Nigeria highlight that technical teachers often lack digital skills in areas like drawing, machining, and engineering material manipulation, which are essential to modern manufacturing (Jadas, et al. 2023). Furthermore, Agbo, Onaga, and Omeje, (2018) in their research noted the scarcity of e-learning opportunities, inadequate ICT facilities (hardware and software), and the subsequent digital skill gaps existing between teachers and students in Nigerian institutions.

In the context of Nigeria, Technical Education and Training (TVET) is crucial for manpower development (Ajiboye, & Adameji, 2017). According to Alafuro, and Asiegbu, (2022), The area of study, Rivers State, hosts institutions integral to technical manpower production, such as Ignatius Ajuru University port Harcourt, Rivers State University and Federal College of Education (Technical) Omoku Given the urgent national need to bridge the technological gap and reduce unemployment, integrating cutting-edge AI competencies into technical education programs in states like Rivers is no longer optional but a necessary strategy to ensure that future graduates possess the high-level skills demanded by the increasingly automated global and local workforce. Relevant AI skills are acquired in TVET through teaching and learning.

Teaching and learning according to Manas B. (2025) is form the core of education, where teaching acts as a deliberate process of facilitating knowledge transfer and skill development, while learning involves the acquisition and internalization of that knowledge through experience and interaction. Teaching is often defined as a

system of actions aimed at inducing learning via teacher-learner interactions, either formally in classrooms or informally in communities, with the goal of behavioral change and cognitive growth. Learning, in turn, represents a relatively permanent modification of behavior, habits, knowledge, or attitudes through practice, observation, or instruction. Teaching and learning are the foundations of education. Teaching involves importing knowledge from a more mature person to a less mature one through interaction, with the goal of inducing learning and causing changes in behavior. Learning is acquiring acquiring new knowledge, skills, or behaviors through experience or instruction. Teaching and learning is carried out in both primary schools, secondary schools, technical colleges, craft centres and tertiary institutions.

Tertiary Institutions according to Eberechukwu, Alphonsus, Grace, Ihuoma, and Marian, (2024) is all formal post-secondary education, including public and private universities, colleges, technical training institutes, and vocational schools for developing skills, attitude, knowledge and mental ability. Tertiary education is instrumental in fostering growth, reducing poverty, and boosting shared prosperity. According to Wikipedia, The World Bank, defines tertiary education as including universities as well as institutions that teach specific capacities of higher learning such as colleges, technical training institutes, community colleges, nursing schools, research laboratories, and distance learning centres. It further stated that; tertiary institution refers to the educational level following the completion of a school providing secondary education. This can be a college, polytechnic or a university. (Akeke, & Ofem, 2016). Obichere, Ogbozor, Tornwe, (2024) views tertiary institution as an educational establishment that provides higher education, typically after the completion of secondary education. These institutions include universities, colleges, technical institutes, and vocational schools. They offer a range of programs such as undergraduate degrees, postgraduate degrees, diplomas, and certificates. Tertiary education focuses on advanced learning and specialization in various fields of study, preparing students for professional careers, research, or further academic pursuits, (World Bank, 2024). This research focuses on the preparedness to integrate AI into teaching and learning in TVET programs can effectively prepare the Rivers State workforce for future technological demands.

Statement of the Problem

The foundational role of TVET according to Alafuro and Asiegbu (2022) is to provide the skills necessary for gainful employment and economic development. However, technical education in Nigeria is hampered by challenges such as inadequate modern facilities, high rates of theoretical teaching compared to practicals, and insufficient funding, leading to the turning out of ill-equipped or half-baked graduates. The current curricula and pedagogical methods often fail to

incorporate the digital skills essential for modern industrial practices (Jadas, et al. 2023).

The rapid advancement and widespread application of Artificial Intelligence across sectors requires new competencies in data analysis, machine learning, and automation (Okhrimenko et al. 2025). Failure to integrate these AI competencies into technical education means that graduates from institutions in Rivers State will continue to face a widening skill gap, making them less competitive and contributing to persistent unemployment, despite the economic potential of the region. Furthermore, the lack of e-learning opportunities and the prevalent inadequate knowledge of ICT among TVET teachers compound the challenge of introducing complex AI-related technologies.

Therefore, the core problem is that despite the critical need for technical manpower equipped with 21st-century digital competencies, particularly AI knowledge, the Technical Education system in Rivers State lacks the necessary resources such as hardware, modern digital equipment, appropriate curricula and human capacity (teacher skills and retraining) to effectively implement AI integration, thereby jeopardizing the preparedness of its future workforce for the demands of a digitally transforming economy.

Purpose of the Study

The purpose of this study is to examine the process of integrating Artificial Intelligence into Teaching and Learning in Technical Education Programs in Tertiary Institutions in Rivers State, Nigeria.

Specifically, this study sort to:

1. Assess the current preparedness of technical education institutions in Rivers State regarding the availability of resources for integrating AI-related technical concepts.
2. Determine the specific AI competencies required by Technical and Vocational Education and Training (TVET) teachers in Rivers State to effectively deliver instruction relevant to future workforce demands.
3. Examine the potential relationship between the successful integration of AI-related technical modules and the measured performance and perceived workforce readiness of TVET students in Rivers State.

Research Questions

The study will be guided by the following research questions:

1. What is the perceived level of availability of AI-related hardware and software resources for technical education programs in Rivers State institutions?
2. What are the perceived AI competency gaps of Technical, Vocational Education and Training (TVET) teachers in Rivers State regarding the integration of artificial intelligence concepts into their pedagogy?
3. To what extent does the integration of AI-related competencies through technical education influence the preparedness and competence of TVET graduates for the demands of the future technologically driven workforce?

Methodology

The study adopted a descriptive survey research design. This design is appropriate as it involves gathering data from a sample of the population regarding their perceptions, opinions, current status, and needs related to the integration of AI in technical education. The area of study is Rivers State, Nigeria. Rivers State is a relevant area due to the presence of tertiary institutions offering TVET programs, such as Federal College of Education (Technical) Omoku, Ignatius Ajuru University of Education and Rivers State University. The population of the study comprises all academic staff involved in Technical Education and Training (TVET) programs, as well as relevant administrative staff such as Heads of Departments and Departmental ICT/E-learning coordinators in public tertiary institutions offering TVET programs in Rivers State which comprises 150 Academic staff/Technologists including administrative officers such as the HODs and departmental ICT coordinators, 74 from Federal college of education (Tech) Omoku, 54 from Ignatius Ajuru University of Education and 22 from Rivers State University (Departmental Record, 2025). A multi-stage sampling technique was employed to select the institutions and the final sample of respondents involves the institutions, the departments and the respondents. The study used census sampling technique as the entire population was studied. The primary instrument for data collection was a structured questionnaire titled “AI Integration into Teaching and Learning in Technical Education Survey (AITTES)". The questionnaire consists of several sections designed to address the research questions. The instrument consists of 30 items on AI Integration into Teaching and Learning in Technical Education aimed at eliciting responses on a Likert -5 point rating scale of Strongly Agree(SA), Agree(A), Undecided(U), Disagree(D),Strongly Disagree(SD) with numerical values of 5,4,3,2 and 1 respectively. Data collected from the research was analyzed using mean and standard deviation.

Results and Discussion

Research Question 1

What is the perceived level of availability of AI-related hardware and software resources (including digital machines and e-learning facilities) for technical education programs in Rivers State institutions?

Table 1: Mean and Standard Deviation on the level of availability of AI-related hardware and software resources.

S/N	Item Statement	Mean ($\bar{x}$)	Std Dev (SD)	Decision
1	AI-enabled machines are adequately available	2.40	1.10	Low Availability
2	Computers capable of running AI applications are sufficient	3.1.	0.98	Moderate
3	Licensed AI software tools are readily accessible	2.55	1.05	Moderately
4	Digital learning platforms are available	3.80	0.82	High
5	Internet connectivity is strong and reliable	2.20	1.12	Low
6	Access to online AI resources is adequate	3.00	1.00	Moderate
7	Smart classroom technologies are available and functional	3.45	0.90	Moderate
8	Students have access to AI programming tools and datasets	2.60	1.08	Moderate
9	Technical support systems for AI resources are sufficient	2.75	1.02	Moderate
10	Available AI resources meet curriculum needs	3.20	0.95	Moderate
Overall Mean		**2.91**	**1.01**	**Moderate Availability**

The results in Table 1 show that the Overall Mean score is 2.91, which indicate a moderate range, suggests that AI-related hardware and software resources are available to some extent but are not sufficiently robust or comprehensive to meet the full demands of AI-driven technical education programs. The standard deviation values ranging from 1.01 further indicate that respondents were not too far from the mean and from one another in their opinion.

Research Question 2

What are the perceived AI competency gaps of Technical, Vocational Education and Training (TVET) teachers in Rivers State regarding the integration of artificial intelligence concepts into their pedagogy?

Table 2: Mean and Standard Deviation on AI competency gaps.

S/N	Item Statement	Mean ($\bar{x}$)	Std Dev (SD)	Decision
1	Teachers lack knowledge of basic AI concepts	3.85	0.78	High gap
2	Teachers are unfamiliar with AI-based instructional tools	3.70	0.82	High
3	Teachers need training to integrate AI into pedagogy	4.10	0.65	High
4	Gap in teachers' ability to use AI for assessment	3.60	0.88	High
5	Teachers lack AI programming/computational thinking skills	3.95	0.75	High
6	Inadequate professional development in AI	3.50	0.90	High
7	Adequate training on applying AI to technical/practical subjects	4.05	0.70	High
8	Teachers have limited confidence in integrating AI	3.55	0.85	High
9	Need for continuous AI capacity-building workshops	4.15	0.62	High

10	Current AI competence is insufficient for curriculum demands	3.80	0.80	High
Overall Mean		**3.83**	**0.78**	**High gap**

The results in Table 2 show that the Overall Mean scores is 3.83, which indicate a high perceived competency gaps. This indicates strong agreement among respondents that TVET teachers require substantial up-skilling in AI-related areas. The standard deviation values ranging from 0.78 showing that respondents were not too far from the mean and from one another in their opinion.

Research Question 3

To what extent does the integration of AI-related competencies through technical education influence the preparedness and competence of TVET graduates for the demands of the future technologically driven workforce?

Table 3: Mean and Standard Deviation on integration of AI-related competencies.

S/N	Item Statement	Mean ($\bar{x}$)	Std Dev (SD)	Decision
1	AI integration improves graduates' overall readiness	4.05	0.72	High influence
2	Exposure to AI enhances problem-solving skills	3.95	0.80	High influence
3	AI skills help graduates adapt to technological changes	4.10	0.68	High influence
4	AI integration improves employability in tech industries	4.00	0.75	High influence
5	Graduates with AI skills show better innovation and creativity	3.85	0.78	High influence
6	AI training equips graduates for automation and smart manufacturing	3.90	0.70	High influence
7	AI skills enhance graduates' global competitiveness	3.80	0.82	High influence

8	AI competencies increase confidence in handling digital tools	3.75	0.85	High influence
9	AI skills contribute to improved decision-making	3.90	0.77	High influence
10	AI integration strengthens readiness for future jobs	4.15	0.65	High influence
Overall Mean		**3.95**	**0.75**	**High influence**

The results in Table 3 show that the Overall Mean scores is 3.95 indicates a high influence on the preparedness and competences of TVET graduates if integrated for future technologically driven workforce. The standard deviation values ranging from 0.75 shows that respondents were not too far from the mean and from one another in their opinion.

Discussion of Findings

The results in Table 1 show that the Overall Mean score is 2.91, which indicate a moderate range, suggests that AI-related hardware and software resources are available to some extent but are not sufficiently robust or comprehensive to meet the full demands of AI-driven technical education programs. The standard deviation values ranging from 1.01 further indicate that respondents were not too far from the mean and from one another in their opinion. This is in agreement with Okhrimenko, et al. (2025), AI technologies offer innovative approaches to managing collections, delivering user-centered services, and enhancing operational efficiency. Libraries, as custodians of knowledge, are increasingly leveraging AI to extend their reach and functionality beyond traditional boundaries.

The results in Table 2 show that the Overall Mean scores is 3.83, which indicate a high perceived competency gaps. This indicates strong agreement among respondents that TVET teachers require substantial up-skilling in AI-related areas. The standard deviation values ranging from 0.78 showing that respondents were not too far from the mean and from one another in their opinion. This is in agreement with Agbo, et al. (2018) who established that universities are still at the initial stage of adopting AI into their Technical Educations and other departments. And further emphasize the critical need for comprehensive training programs, targeted professional development, and continuous capacity-building initiatives to equip teachers with the necessary AI knowledge and skills.

The results in Table 3 show that the Overall Mean scores is 3.95 indicates a high influence on the preparedness and competences of TVET graduates if integrated for

future technologically driven workforce. The standard deviation values ranging from 0.75 shows that respondents were not too far from the mean and from one another in their opinion. This is in agreement with Jadas, et al. (2023) who emphasized that integrating AI competencies into TVET curricula has a significant and positive influence on graduates' technical competence, adaptability, confidence, and employability, making them better prepared to meet the demands of a future technologically driven workforce.

Conclusion

The study examined the Preparedness to Integrate Artificial Intelligence into Teaching and Learning in Technical Education Programs in Tertiary Institutions in Rivers State. Findings from the review and analysis reveal that AI-related hardware and software resources (including digital machines and e-learning facilities) for technical education programs in Rivers State will go a long way in preparing and equipping our technical education graduates for future digital workforce. The results show that AI enhances efficiency in advanced technological skills, tools manipulations and user support services.

The study further indicates that TVET teachers require substantial up-skilling in AI-related areas such as continuous AI capacity-building workshops or training to effectively deliver instruction relevant to future technological and AI-driven workforce demands. The results confirms that without targeted professional development and structured training initiatives, teachers may struggle to effectively integrate artificial intelligence into their teaching practices and meet the demands of evolving TVET curricula.

However, the study further indicates that integrating AI competencies into TVET curricula has a significant and positive influence on graduates' technical competence, adaptability, confidence, and employability, making them better prepared to meet the demands of a future technologically driven workforce.

Recommendation

Based on the results of this research, the following recommendation are hereby proffered:

1. The Federal government in collaboration with the Rivers state government should invest in Infrastructure Improvement such as AI-enabled machines, software licenses, and stable internet connectivity in all technical institutions.
2. The tertiary institutions in the state should always organize Teacher Capacity-Building programs: Such as continuous professional development and training workshops for TVET teachers on AI concepts, tools, and pedagogy.
3. Curriculum Enhancement: there should be Integration of AI competencies into TVET curricula with practical, hands-on modules for students.

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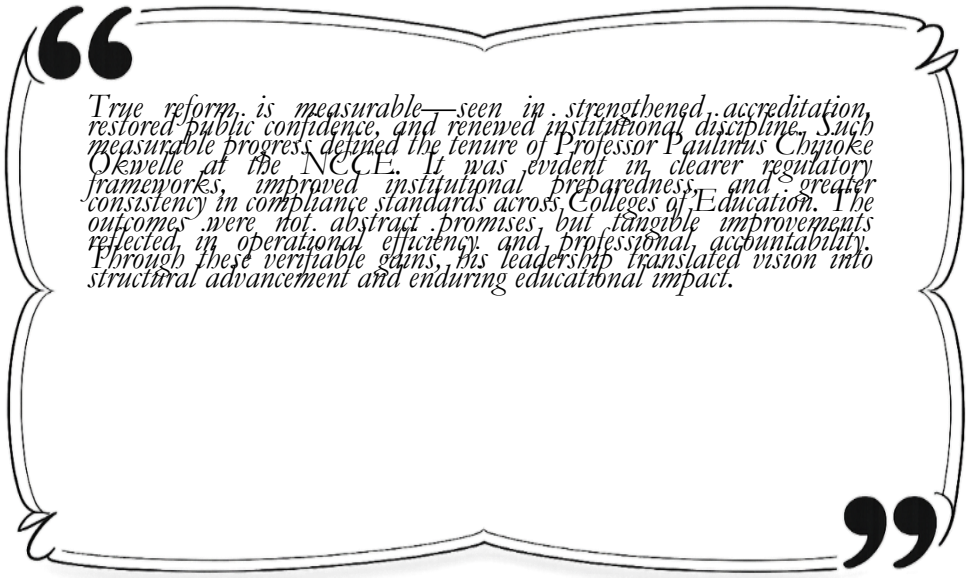
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Chapter 49

Digital Transformation in Teacher Preparation: Opportunities and Challenges for Nigerian Colleges of Education

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Abstract

Digital transformation is increasingly redefining education systems worldwide, with teacher preparation institutions occupying a strategic position in shaping the competencies of future educators. In Nigeria, Colleges of Education (COEs), which are primarily responsible for training teachers for basic education, face growing pressure to align their programs with the demands of digitally mediated teaching and learning environments. This paper examines the opportunities and challenges associated with digital transformation in Nigerian teacher preparation programs. Drawing on recent scholarly literature, national policy documents, and international frameworks, it analyzes how digital technologies can enhance pedagogy, assessment practices, professional development, and institutional management within COEs. At the same time, the paper interrogates persistent systemic barriers, including inadequate infrastructure, limited digital competence among teacher educators, funding constraints, policy–practice disconnects, and resistance to institutional change. Using the Technological Pedagogical Content Knowledge (TPACK) framework and the SAMR (Substitution, Augmentation, Modification, and Redefinition) model as theoretical lenses, the study proposes strategic pathways for strengthening digital readiness in Colleges of Education. The paper concludes that although Nigerian COEs face significant structural and contextual challenges, coordinated investment, sustained capacity building, coherent policy implementation, and effective leadership can unlock the transformative potential of digital technologies in teacher education.

Keywords: *digital transformation, teacher preparation, Nigerian Colleges of Education, TPACK, SAMR, teacher professional development*

Introduction

The rapid advancement of digital technologies has fundamentally reshaped the ways knowledge is produced, accessed, and disseminated across societies, with profound implications for education systems worldwide. Digital transformation in education now extends beyond the mere adoption of tools to encompass systemic changes in pedagogy, curriculum design, assessment practices, and institutional management. Technologies such as virtual learning environments, cloud-based resources, digital textbooks, artificial intelligence–driven learning analytics, and collaborative online platforms have expanded pedagogical possibilities, enabling more personalized, flexible, and learner-centered approaches (UNESCO, 2023; OECD, 2024). These developments have also redefined the roles of teachers and learners, positioning teachers as facilitators and designers of learning experiences rather than sole transmitters of knowledge.

In Nigeria, Colleges of Education (COEs) occupy a strategic position within the teacher education ecosystem, as they are the primary institutions responsible for training teachers for basic education through the Nigeria Certificate in Education (NCE). As the demands of 21st-century education intensify, COEs are expected to move beyond traditional, lecture-dominated instructional models toward digitally enriched teaching and learning environments that foster creativity, collaboration, and problem-solving. The relevance of this shift has been reinforced by global evidence showing that digitally competent teachers are better equipped to support inclusive education, differentiated instruction, and continuous professional learning (European Commission, 2023). For Nigerian COEs, embracing digital transformation is therefore not only a matter of modernization but also a prerequisite for improving the quality and relevance of teacher education in line with national development goals and global education standards.

The urgency of digital transformation in Nigerian teacher education became particularly evident during the COVID-19 pandemic, which severely disrupted conventional face-to-face instruction and forced institutions to adopt emergency remote teaching modalities. While some universities and private institutions were able to transition partially to online platforms, many Colleges of Education struggled due to inadequate digital infrastructure, limited internet connectivity, insufficient access to devices, and low levels of staff digital readiness. Studies conducted in the post-pandemic period indicate that these challenges exposed long-standing structural weaknesses in Nigeria's education system, including underinvestment in educational technology and limited institutional capacity for innovation (World Bank, 2021; African Development Bank, 2023). At the same time, the pandemic underscored the potential of digital technologies to enhance resilience, continuity, and access in teacher education when appropriate systems and competencies are in place.

In response to these realities, the Nigerian government has introduced several policy initiatives aimed at promoting digitalization across sectors, including education. Key among these are the National Digital Economy Policy and Strategy (2020–2030), the National Policy on ICT in Education, and recent reforms emphasizing digital skills development for teachers and learners. Additionally, interventions by agencies such as the Tertiary Education Trust Fund (TETFund) have supported ICT infrastructure development, staff training, and e-learning projects in some tertiary institutions. However, recent evidence suggests that progress within Colleges of Education remains uneven and fragmented (Federal Ministry of Education, 2023). Many COEs continue to face challenges such as unreliable power supply, inadequate bandwidth, limited technical support, and insufficient professional development opportunities for academic staff.

Against this backdrop, there is a growing need for systematic inquiry into the state of digital transformation within Nigerian Colleges of Education. This paper examines the opportunities and challenges associated with digital transformation in COEs, with particular attention to institutional readiness, infrastructure, staff capacity, and pedagogical integration. By situating the discussion within Nigeria's national reform agenda and drawing on global best practices in teacher education, the study seeks to propose strategic approaches for strengthening digital readiness in Colleges of Education. In doing so, it contributes to ongoing scholarly and policy debates on how digital transformation can be harnessed to enhance the quality, equity, and future relevance of teacher education in Nigeria.

Conceptual and Theoretical Frameworks

Conceptualizing Digital Transformation in Teacher Education

Digital transformation in education goes well beyond the acquisition of computers, internet access, or standalone educational software. Contemporary scholarship emphasizes that it represents a holistic and strategic process involving deep changes to pedagogical practices, institutional structures, and organizational culture through the purposeful and sustained integration of digital technologies (OECD, 2020; UNESCO, 2023). Rather than focusing solely on technology deployment, digital transformation prioritizes how digital tools reshape teaching, learning, assessment, leadership, and governance. In teacher education, this transformation is particularly critical because teacher preparation institutions not only adopt digital practices for their own instructional delivery but also shape the digital competencies, attitudes, and pedagogical orientations of future teachers who will, in turn, influence learning outcomes across the education system.

Within the context of teacher education, digital transformation encompasses the redesign of curricula to embed digital pedagogy, digital literacy, and ethical technology use as core components of professional teacher knowledge. This includes

preparing preservice teachers to use digital tools for lesson design, collaborative learning, inclusive education, and formative assessment, as well as to critically evaluate educational technologies and digital content (European Commission, 2023). It also involves the adoption of online and blended learning models that expand access, flexibility, and personalization, alongside the use of technology-enhanced assessment and feedback systems such as learning management systems, e-portfolios, and learning analytics. Recent studies highlight that such approaches can improve student engagement and reflective practice when aligned with sound pedagogical principles (OECD, 2022; World Bank, 2023).

Beyond teaching and learning processes, digital transformation in teacher education also requires robust institutional and governance frameworks. This includes the establishment of digital policies, data management systems, and quality assurance mechanisms that support evidence-based decision-making and continuous improvement. Digital governance structures enable institutions to monitor student progress, evaluate instructional effectiveness, and allocate resources more efficiently (UNESCO, 2024). Importantly, these structural changes must be accompanied by a cultural shift among educators and administrators, in which technology is viewed not as an optional supplement to traditional methods but as an integral and strategic component of effective teacher preparation. Research consistently shows that institutional culture and leadership commitment are decisive factors in determining whether digital initiatives lead to meaningful transformation or superficial adoption (OECD, 2021).

For Nigerian Colleges of Education, conceptualizing digital transformation in this systemic manner has significant implications. It suggests that transformation efforts must move beyond isolated ICT projects or donor-funded interventions toward institution-wide strategies that align vision, curriculum design, staff professional development, infrastructure provision, and quality assurance. Evidence from developing country contexts indicates that fragmented digital initiatives often fail to achieve sustainability or pedagogical impact due to weak coordination and limited institutional ownership (World Bank, 2021; African Development Bank, 2023). Consequently, understanding digital transformation as both a technological and organizational change process is essential for assessing current practices in Nigerian COEs and identifying realistic pathways for sustainable improvement. Such a conceptual framing provides a foundation for evaluating digital readiness, addressing structural constraints, and positioning teacher education institutions to respond effectively to the demands of digitally mediated schooling in the 21st century.

TPACK Framework

The Technological Pedagogical Content Knowledge (TPACK) framework, originally developed by Mishra and Koehler (2006), remains one of the most influential theoretical models for understanding meaningful technology integration in teacher

education. Building on Shulman's concept of pedagogical content knowledge, the TPACK framework conceptualizes effective teaching with technology as the dynamic intersection of three core knowledge domains: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). Contemporary interpretations emphasize that technology integration is not additive but relational, requiring teachers to make context-sensitive decisions about how digital tools can best represent subject matter, support specific instructional strategies, and address learners' needs (Mishra, Koehler, & Cain, 2022; Koehler et al., 2023). As such, TPACK provides a valuable lens for examining both the competencies teachers need and the ways teacher education programs structure learning experiences around technology.

Recent research underscores the continued relevance of the TPACK framework in teacher preparation, particularly in digitally evolving educational environments. Studies show that pre-service teachers who develop strong TPACK are more likely to use technology in pedagogically meaningful ways, such as facilitating inquiry-based learning, collaborative problem-solving, and formative assessment, rather than relying on technology for content delivery alone (Valtonen et al., 2023; Schmid et al., 2024). Moreover, the framework highlights the importance of contextual factors, including institutional support, access to digital resources, and opportunities for guided practice, in shaping how teachers translate technological knowledge into effective classroom practice. In this sense, TPACK aligns closely with contemporary calls for practice-oriented, reflective, and discipline-specific approaches to digital pedagogy in teacher education.

In many Nigerian Colleges of Education, however, efforts to promote ICT integration have tended to focus disproportionately on technological knowledge, often through standalone computer literacy or "ICT in education" courses. These courses typically emphasize basic skills such as word processing, presentation software, or internet browsing, with limited attention to how such tools can be embedded within subject-specific pedagogy (Ogunbodede et al., 2023; Awofala, Omilabu, & Awofala, 2025). While foundational digital skills are necessary, evidence suggests that this skills-based approach does little to transform teaching practice or improve learning outcomes, as pre-service teachers struggle to transfer generic ICT competencies into meaningful classroom applications (Chukwu, 2024). This gap reflects a misalignment between curriculum design and the integrated knowledge structures emphasized by the TPACK framework.

The TPACK framework therefore highlights the need for Nigerian teacher education programs to move toward more integrated and practice-oriented models of technology preparation. This involves embedding digital tools within subject methods courses, modeling technology-enhanced pedagogy by teacher educators, and providing structured opportunities for pre-service teachers to design, implement,

and reflect on technology-supported lessons during teaching practice (UNESCO, 2023; European Commission, 2023).

SAMR Model

The SAMR model, developed by Puentedura (2014), offers a widely used conceptual framework for understanding the depth and quality of technology integration in educational practice. The model categorizes technology use into four progressive levels: substitution, augmentation, modification, and redefinition. At the substitution level, digital tools merely replace traditional tools without any significant change in instructional function, such as using word processors instead of handwritten notes. Augmentation represents a slight functional improvement, for example, adding multimedia elements or hyperlinks to digital lecture materials. In contrast, the higher levels of the model—modification and redefinition—emphasize transformative uses of technology, where learning tasks are significantly redesigned or entirely new forms of learning are made possible through digital tools (Hamilton, Rosenberg, & Akcaoglu, 2016; Puentedura, 2014).

Recent studies continue to affirm the relevance of the SAMR model for analyzing technology integration in teacher education, particularly in contexts where digital adoption is still emerging. Research indicates that progression to the modification and redefinition levels is associated with higher student engagement, deeper learning, and the development of critical thinking and collaboration skills (Schindler et al., 2023; OECD, 2022). At these levels, technology enables practices such as collaborative online inquiry, real-time formative assessment, simulation-based learning, and the co-creation of digital content. Importantly, the SAMR model underscores that effective digital transformation is not defined by the frequency of technology use but by the extent to which technology reshapes pedagogical design and learning outcomes.

Evidence from Nigerian Colleges of Education suggests that the majority of technology use remains concentrated at the lower levels of substitution and augmentation. Common practices include replacing chalkboards with digital projectors, using presentation software for lectures, or distributing course materials via email or messaging platforms (Ogunbodede et al., 2023; Chukwu, 2024). While these practices improve efficiency and access to learning materials, they often replicate traditional, teacher-centered instructional approaches rather than fostering innovation. Studies conducted in Nigerian teacher education institutions indicate that limited digital pedagogical skills, inadequate infrastructure, and curriculum structures that do not prioritize technology-enhanced learning contribute to this stagnation at the lower levels of the SAMR continuum (Awofala et al., 2025).

Meaningful digital transformation in Nigerian Colleges of Education therefore requires deliberate efforts to move toward the modification and redefinition stages

of the SAMR model. This shift involves redesigning instructional activities to leverage digital tools for collaborative problem-solving, project-based learning, reflective practice, and authentic assessment. For example, pre-service teachers can engage in virtual microteaching, develop digital portfolios, participate in online communities of practice, or use learning analytics to reflect on teaching effectiveness. Recent global and regional policy reports emphasize that achieving such transformative integration depends on sustained professional development, supportive leadership, and institutional policies that encourage experimentation and innovation (UNESCO, 2023; African Development Bank, 2023). Viewed through the SAMR lens, digital transformation in teacher education is thus a gradual but intentional process of pedagogical change, rather than a simple transition from analogue to digital tools.

The Landscape of Teacher Preparation in Nigeria

Colleges of Education occupy a central position in Nigeria's teacher education system, with a mandate to train teachers for basic education and contribute to national human capital development. Supervised by the National Commission for Colleges of Education, these institutions are expected to implement curricula that balance subject mastery, pedagogical competence, and professional values. In recent years, policy documents and curriculum revisions have increasingly emphasized the importance of ICT competence for teachers, reflecting global trends and national development priorities.

Despite this policy emphasis, the actual status of ICT integration across COEs remains uneven. While a small number of institutions have developed functional ICT centers, smart classrooms, and internet-enabled campuses, many continue to operate with limited resources and outdated facilities. TETFund (2022) reports indicate that ICT infrastructure in many COEs is insufficient to support large-scale digital learning initiatives. Moreover, technology use often depends on the initiative of individual lecturers rather than being guided by coherent institutional strategies. As a result, ICT integration tends to focus on basic skills acquisition rather than on innovative digital pedagogy, leaving considerable room for improvement.

Opportunities for Digital Transformation in Teacher Preparation

Digital transformation offers significant opportunities to enhance teaching and learning within Colleges of Education. Digital pedagogical tools can support more interactive, learner-centered approaches that encourage collaboration, critical thinking, and reflective practice. Learning management systems, multimedia resources, simulations, and educational applications enable teacher trainees to engage with content in diverse and meaningful ways, consistent with contemporary theories of learning (UNESCO, 2022). For example, digital simulations allow science education students to visualize abstract concepts, while video-based tools

enable pre-service teachers to record, review, and reflect on their microteaching sessions, thereby strengthening reflective practice and professional growth.

The expansion of online and blended learning models also presents opportunities to increase access and flexibility in teacher education. By combining face-to-face instruction with online components, COEs can accommodate diverse learner needs, support part-time students, and mitigate disruptions caused by crises such as pandemics or industrial actions. Digital platforms, including learning management systems and video-conferencing tools, can also extend institutional reach to underserved and remote communities, thereby promoting equity in access to teacher education (World Bank, 2021).

Another critical opportunity lies in the development of teacher digital competencies. Digital transformation enables COEs to systematically prepare teacher candidates for technology-enhanced lesson planning, digital assessment, online classroom management, and the ethical use of technology. International frameworks such as the European Digital Competence Framework for Educators provide structured benchmarks that Nigerian institutions can adapt to local contexts (Redecker, 2017). Through such alignment, teacher education programs can ensure that graduates are equipped to meet the demands of contemporary classrooms.

Technology-enhanced assessment represents an additional area of opportunity. Digital assessment tools can provide immediate feedback, support automated grading, and generate data that inform instructional decisions. Digital portfolios, in particular, allow teacher trainees to document their professional growth over time, supporting reflective practice and competency-based assessment. Beyond pedagogy, digital transformation can also improve institutional management by streamlining academic planning, student records management, financial administration, research coordination, and quality assurance processes. These efficiencies contribute to transparency, accountability, and overall institutional effectiveness.

Challenges of Digital Transformation in Nigerian Colleges of Education

Despite these opportunities, Nigerian Colleges of Education face substantial challenges in their efforts to achieve meaningful digital transformation. Inadequate infrastructure remains a major constraint, with unreliable electricity supply, limited broadband connectivity, insufficient access to devices, and weak maintenance systems undermining digital initiatives (Nwachukwu et al., 2020). Without reliable infrastructure, even well-designed digital strategies are difficult to implement and sustain.

Human capacity challenges further complicate the situation. Many teacher educators lack confidence and competence in using digital tools for pedagogical purposes, curriculum development, or assessment. Research suggests that professional development opportunities in digital pedagogy are often sporadic, theoretical, and

insufficiently aligned with classroom practice (Odeyemi & Ajayi, 2021). As a result, lecturers may resist technology use or employ it in ways that do not significantly enhance learning.

Funding constraints also pose a serious challenge. While interventions such as TETFund ICT projects have provided some support, the scale of investment required for comprehensive digital transformation far exceeds available resources. At the institutional level, ICT budgets are often under-prioritized in favor of more immediate operational needs. Moreover, policy–practice gaps persist, as national ICT policies are not consistently translated into actionable institutional plans, monitoring mechanisms, or capacity-building programs (Federal Ministry of Education, 2019).

Socioeconomic inequalities among students further exacerbate digital divides, as many teacher trainees lack personal devices, stable internet access, or prior exposure to digital learning environments. Cultural and attitudinal barriers also play a role, with some educators perceiving technology as a threat to traditional teaching roles or as an added burden rather than a pedagogical opportunity. These factors collectively limit the pace and depth of digital transformation in COEs.

Strategies for Strengthening Digital Transformation in Colleges of Education

Addressing these challenges requires a multifaceted and coordinated approach. Investment in infrastructure and connectivity is essential, including the provision of stable electricity, campus-wide broadband, and sustainable maintenance systems. Innovative solutions such as solar energy and public–private partnerships can help mitigate infrastructural deficits. Equally important is the sustained capacity building of teacher educators, with professional development programs that emphasize digital pedagogy, TPACK integration, and continuous mentoring rather than one-off training workshops.

Effective policy implementation is also critical. Colleges of Education should develop institutional ICT strategic plans aligned with national policies, while regulatory bodies such as the NCCE strengthen monitoring, evaluation, and technical support mechanisms. Promoting digital inclusion among students through device-loan schemes, subsidized data access, and inclusive digital materials can help address socioeconomic disparities. In addition, encouraging research and innovation in digital pedagogy can foster a culture of experimentation and evidence-based practice within teacher education.

Ultimately, leadership and change management play a decisive role in digital transformation. Visionary institutional leadership, supportive governance structures, incentives for innovation, and collaborative professional cultures are essential for embedding digital technologies into the core functions of Colleges of Education. Without such leadership, digital initiatives are unlikely to move beyond isolated projects.

Conclusion

Digital transformation presents a powerful opportunity to strengthen teacher preparation in Nigerian Colleges of Education by enhancing pedagogy, expanding access, improving assessment practices, and increasing institutional efficiency. However, realizing this potential requires more than the provision of technology. It demands strategic investment, sustained capacity development, coherent policy implementation, and inclusive approaches that address infrastructural, human, and cultural barriers. The future relevance and quality of teacher education in Nigeria depend on the ability of COEs to embrace digital transformation in a purposeful and sustained manner. With coordinated efforts from government, institutions, educators, and development partners, digital technologies can become a key driver of educational quality, equity, and national development.

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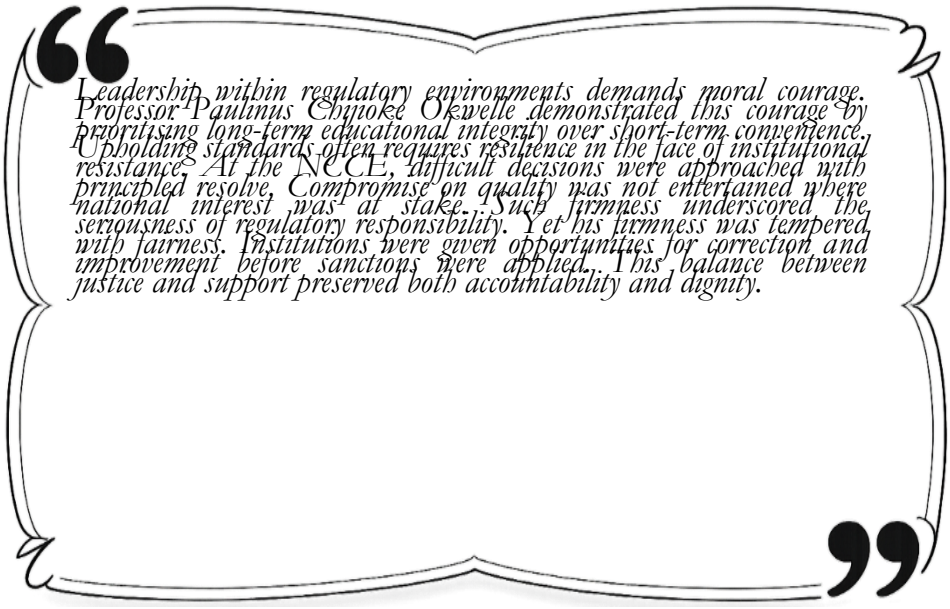
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Chapter 50

Information And Communication Technology as A Catalyst for Poverty Alleviation and Employment Generation: A Conceptual Framework

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Abstract

The chapter explores the role of information and communication technology in poverty alleviation and employment generation. The chapter went further to look at conceptual clarification. Theoretical perspectives, pathways through which ICT alleviate poverty and conceptual framework linking ICT, employment generation and poverty alleviation. Finally, ICT as a catalyst for poverty alleviation and employment generation.

Keywords: *Catalyst, Conceptual Framework, Employment Generation, Information and Communication Technology (ICT), Poverty Alleviation*

Introduction

Information and Communication Technology (ICT) has emerged as one of the most influential drivers of socio-economic transformation in the twenty-first century, reshaping how individuals, institutions, and nations produce, distribute, and consume knowledge and resources. Beyond its traditional role in information exchange, ICT increasingly functions as a strategic development instrument capable of accelerating economic growth, enhancing productivity, and fostering social inclusion, particularly in developing economies (World Bank, 2016). Through digital connectivity, ICT reduces spatial and information dissemination barriers, enabling broader participation in economic activities that were previously inaccessible to less-privileged populations. This expanding developmental relevance of ICT provides a necessary foundation for understanding its potential contributions to poverty

alleviation and employment generation, which are explored further in the context of global development challenges.

Poverty remains a persistent and multidimensional challenge, characterized not only by income deprivation but also by limited access to education, health services, employment opportunities, and social participation. Despite sustained economic growth in some regions, disparities in income distribution and employment quality continue to widen, particularly in low- and middle-income countries (United Nations Development Programme [UNDP], 2022). ICT has been increasingly recognized as a mechanism through which poor and vulnerable populations can access livelihood opportunities, enhance human capital, and improve resilience against economic shocks. By facilitating access to information, markets, and digital financial services, ICT interventions offer pathways out of poverty. It also complements traditional development strategies, which creates a bridge to the discussion of employment dynamics.

Employment generation is a critical issue when poverty reduction is discussed. ICT remains the most sustainable route to improved living standards as it enhances labour market participation. ICT stimulates employment both directly, through the creation of jobs in the digital and technology sectors, and indirectly, by enabling productivity, entrepreneurship, and innovation across agriculture, manufacturing, and services (International Labour Organization [ILO], 2018). Digital platforms, remote work arrangements, and technology-enabled micro-enterprises have expanded the scope of employment beyond formal labour markets, particularly for youth and women. These evolving employment structures highlight the need to examine how ICT-enabled skills, innovation, and market access interact to generate inclusive economic opportunities.

Central to the employment potential of ICT is its role in skill acquisition ad human capital development. Digital literacy, technical competencies, and adaptive skills are increasingly essential for meaningful participation in modern labour markets, and furthermore ICT-based education and training systems provide saleable and cost-effective solutions for skill development (OECD, 2019). E-learning platforms, online vocational training, and digital knowledge networks empower individuals to upgrade skills in response to changing labour demands, thereby enhancing employability and entrepreneurial capacity. The emphasis on skills development underscores the importance of considering the structural and institutional conditions that shape ICT access and utilization.

It presents substantial opportunities, but its benefits are not automatically realized as ICT is often mediated by contextual and socio-economic factors such as unequal access to digital infrastructure, affordability constraints, policy gaps, and socio-cultural barriers. These continue to limit the reach of ICT-driven development initiatives, reinforcing what is commonly described as the digital divide (Van Dijk,

2020). In many developing economies, limited electricity supply, inadequate regulatory frameworks, and low institutional capacity are constraint to the transformative potential of ICT for poverty reduction and employment creation. These persistent gaps signal a critical problem that necessitates a more integrated and systematic understanding of how ICT interacts with economic and social systems.

The problem, therefore, lies not in the absence of ICT initiatives, but in the lack of coherent frameworks that clearly explain the pathways through which ICT translates into sustainable employment and measurable poverty alleviation outcomes. Many interventions focus on technology deployment without adequately addressing mediating variables such as skills, market linkages, and institutional support, resulting in fragmented impacts (Heeks, 2018). This disconnects between ICT adoption and development outcomes underscores the need for a conceptual framework that captures the complex relationships among ICT access, employment mechanisms, and poverty reduction processes.

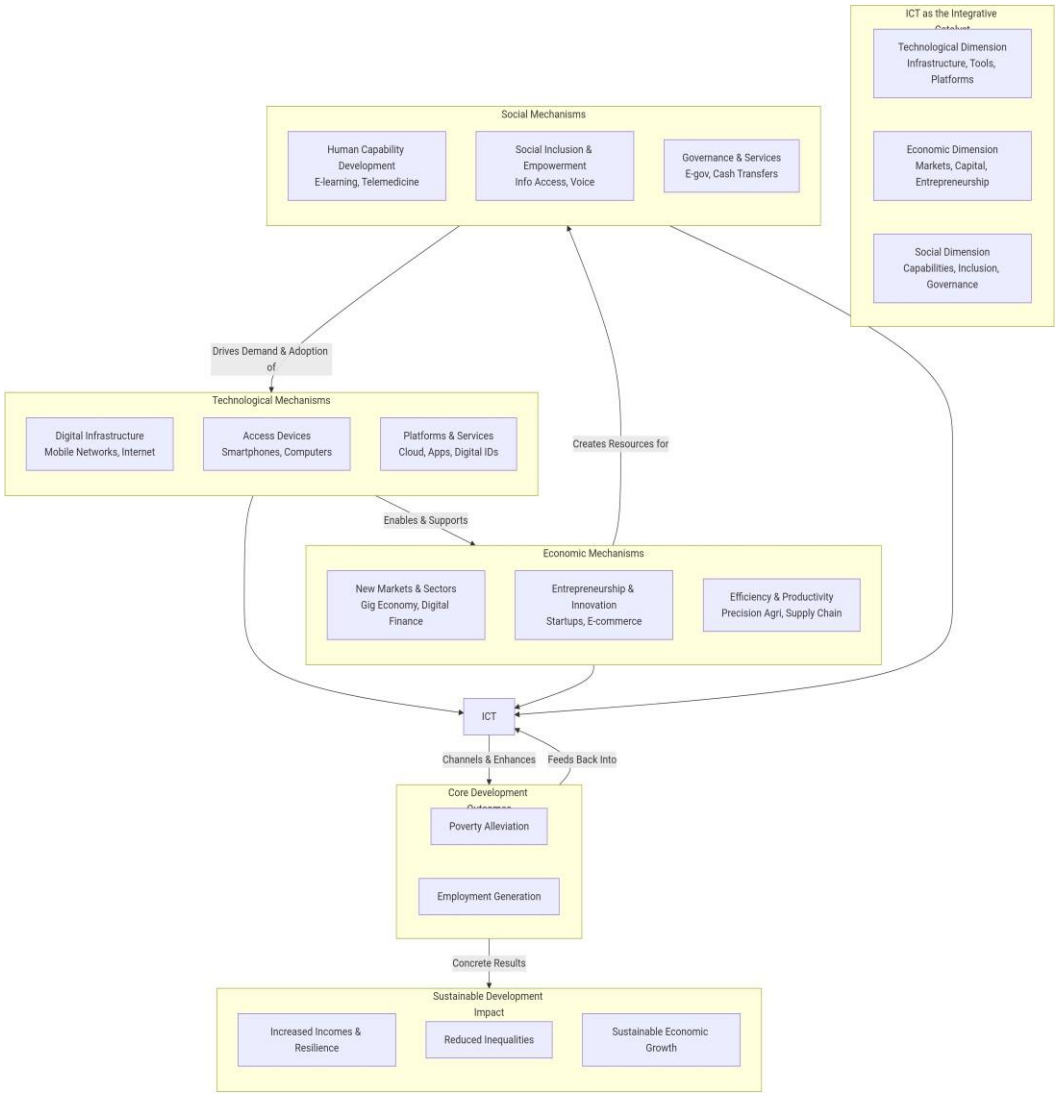
Against this backdrop, a conceptual framework becomes essential for systematically explaining how ICT functions as a catalyst for poverty alleviation and employment generation by integrating technological, economic, and social dimensions. Such a framework provides analytical clarity, guides empirical inquiry, and supports evidence-based policy formulation aimed at inclusive development. It is within this context that this chapter situates its discussion.

Conceptual Framework and Clarifications

A conceptual framework provides a structured representation of the key concepts, variables, and relationships underlying a study. It serves as an analytical tool that explains how different elements interact to produce specific outcomes, thereby guiding empirical investigation and policy analysis (Ravitch & Riggan, 2017). In development research, conceptual frameworks help to clarify causal pathways and contextual factors that influence the effectiveness of interventions.

Within the discourse on ICT, poverty alleviation, and employment generation, a conceptual framework illustrates how ICT inputs translate into socio-economic outcomes through mediating variables such as skills development, entrepreneurship, and market access. It also highlights intervening factors including policy environment, infrastructure, and institutional support that shape the strength of these relationships. Such a framework enhances understanding and supports evidence-based decision-making.

A Conceptual Framework for Information and Communication Technology as A Catalyst for Poverty Alleviation and Employment



Linking ICT, Employment Generation and Poverty Alleviation

The conceptual framework positions **Information and Communication Technology (ICT)** as the primary driving force that influences employment generation and ultimately leads to poverty alleviation through several interrelated pathways. ICT serves as the independent variable, providing digital infrastructure, connectivity, platforms, and tools that expand access to information, skills, markets, and services. Through these mechanisms, ICT enhances individuals' productive capacities and participation in economic activities.

Employment generation functions as a key mediating variable in the framework. ICT facilitates employment directly through ICT-related jobs and indirectly by enabling entrepreneurship, self-employment, digital enterprises, remote work, and productivity improvements across sectors such as agriculture, education, and services. These employment opportunities lead to increased income, improved livelihood stability, and enhanced economic resilience.

Poverty alleviation represents the dependent outcome, achieved when ICT-enabled employment and income opportunities translate into improved living standards, reduced vulnerability, and greater access to essential services. The framework also recognizes the role of intervening and moderating factors such as, digital literacy, policy and regulatory environment, infrastructure availability, and institutional support which influence the strength and effectiveness of the relationships among ICT, employment generation, and poverty reduction.

Overall, the framework illustrates a logical flow in which ICT adoption strengthens human capital and economic participation, employment generation serves as the transmission mechanism, and poverty alleviation emerges as the ultimate development outcome.

Information and Communication Technology (ICT)

Information and Communication Technology refer to the broad range of digital tools, systems, and infrastructure used for creating, storing, processing, and communicating information. It encompasses hardware, software, telecommunications networks, internet services, and digital platforms that collectively support information exchange and decision-making processes across sectors (World Bank, 2016). In development discourse, ICT is increasingly viewed as an enabler of efficiency, transparency, and innovation, particularly in education, agriculture, health, and commerce. Its relevance lies not only in technological advancement but also in its capacity to restructure socio-economic interactions and reduce information asymmetries that constrain development outcomes.

In the context of poverty alleviation and employment generation, ICT provides foundational support for skills acquisition, market integration, and enterprise

development. Digital tools facilitate access to timely information, reduce transaction costs, and expand opportunities for participation in economic activities beyond geographical limitations (OECD, 2019). By enabling connectivity and knowledge sharing, ICT strengthens human capital and enhances productivity, thereby positioning it as a strategic instrument for inclusive economic development and social transformation.

Poverty Alleviation: Poverty alleviation involves the application of deliberate strategies and interventions aimed at reducing deprivation and improving living conditions through increased income earning capacity, access to basic services, and enhanced livelihood opportunities. Contemporary understandings of poverty extend beyond income insufficiency to include social exclusion, limited capabilities, and restricted access to opportunities that enable individuals to live productive lives (UNDP, 2022). Effective poverty alleviation therefore requires multidimensional approaches that address structural constraints to empower individuals economically and socially.

ICT contributes to poverty alleviation by enabling access to information, education, financial services, and markets that were previously inaccessible to less-privileged populations. Digital financial inclusion, online learning platforms, and information services empower households to diversify income sources and build resilience against economic shocks (Heeks, 2018). Through these pathways, ICT supports sustainable livelihood strategies that move individuals from vulnerability toward economic self-reliance.

Employment Generation: Employment generation refers to the creation of productive and sustainable job opportunities that provide income and contribute to economic growth. It remains a central objective of development policy, as gainful employment is the most reliable means of improving household welfare and reducing poverty (International Labour Organization [ILO], 2018). Employment can be generated through formal wage labour, self-employment, entrepreneurship, and emerging digital work arrangements.

ICT has transformed employment structures by creating new job categories and redefining how work is organized and delivered. Digital platforms, remote work, and technology-enabled enterprises expand labour market participation, particularly for youth and women who face barriers in traditional employment systems (ILO, 2021). As a result, ICT-driven employment pathways have become increasingly significant in addressing unemployment and underemployment in developing economies.

Other Related Concepts Clarification

ICT Access and Usage: ICT access and usage refer to the availability, affordability, and effective utilization of digital technologies such as internet services, mobile devices, and digital platforms by individuals and communities. Access alone does

not guarantee developmental impact; meaningful usage, defined by the ability to apply ICT tools productively for learning, communication, and economic activities, is critical for socio-economic transformation (Van Dijk, 2020). In development contexts, disparities in ICT access are often shaped by income levels, geographic location, infrastructures availability, and policy support, which collectively influence who benefits from digital opportunities.

In relation to ICT as a catalyst for poverty alleviation and employment generation, access and usage determine the extent which individuals can participate in the digital economy. Effective ICT usage enables access to labour market information, digital financial services, online education, and entrepreneurial platforms that enhance income-generating opportunities (World Bank, 2016). Where access is widespread and usage is productive, ICT strengthens economic inclusion and supports employment pathways that contribute to poverty reduction.

Skills Development and Innovation: Skills development and innovation represent key mechanisms through which ICT translates into employment and economic growth. Digital skills, including basic digital literacy, technical competencies, and problem-solving abilities, are increasingly essential for participation in modern labour markets (OECD, 2019). ICT-enabled training systems, such as online learning platforms and virtual skill-acquisition programmes, expand opportunities for continuous learning and workforce adaptability, particularly in contexts where traditional education systems face capacity constraints.

Innovation emerges when digital skills are applied to create new products, services, and processes that enhance productivity and competitiveness. ICT facilitates innovation by enabling knowledge sharing, collaboration, and access to global markets, thereby supporting entrepreneurship and enterprise development (UNDP, 2022). Through skills development and innovation, ICT empowers individuals to move beyond subsistence economics activities toward higher-value economic engagement, reinforcing its role in employment generation and sustainable development.

Poverty Reduction Outcomes: Poverty reduction outcomes reflect improvements in income levels, livelihood security, and access to essential services that enhance overall wellbeing. ICT contributes to these outcomes by expanding economic opportunities, reducing transaction costs, and improving access to information and social services (Heeks, 2018). When individuals leverage on ICT for employment, entrepreneurship, and financial inclusion, they are better positioned to achieve stable incomes and build resilience against economic vulnerabilities and shocks.

In the broader context of development, ICT-driven poverty reduction is most effective when supported by inclusive policies, institutional capacity, and equitable access to digital resources. Evidence suggests that ICT interventions that integrate

skills development, market access, and supportive infrastructure produce more sustainable poverty alleviation outcomes than isolated technology deployment (ILO, 2018). These outcomes affirm the relevance of ICT as a catalytic force that links employment generation with long-term poverty reduction.

ICT as a Catalyst for Poverty Alleviation and Employment Generation

The term catalyst denotes a factor that accelerates or enhances a process without being consumed by it. In this context, ICT acts as a catalyst by intensifying and accelerating pathways that lead to employment creation and poverty reduction. Rather than functioning as an isolated solution, ICT amplifies the effectiveness of education, enterprise development, and market participation by reducing barriers and increasing efficiency (World Bank, 2016).

As a catalyst, ICT enables innovation, expands economic inclusion, and strengthens linkages between individuals and opportunities. When supported by appropriate policies, infrastructure, and skills development initiatives, ICT-driven systems can generate sustainable employment and contribute meaningfully to poverty alleviation (UNDP, 2022). This catalytic role underscores the importance of integrating ICT into development strategies aimed at achieving inclusive and sustainable socio-economic progress.

Information and Communication Technology (ICT) serve as a catalyst for socio-economic development by enabling access to information, expanding economic opportunities, and fostering innovation that directly impacts poverty alleviation and employment generation. By bridging geographical and informational gaps, ICT empowers individuals and communities to participate in economic activities that were previously inaccessible (World Bank, 2016). The integration of digital technologies in business, education, and governance enhances productivity, reduces transaction costs, and improves efficiency, positioning ICT as a transformative force that accelerates inclusive economic growth.

ICT facilitates employment generation through multiple pathways, including the creation of ICT-related jobs, promotion of digital entrepreneurship, and expansion of remote or platform-based work. These opportunities are particularly critical for youth and marginalized groups, who often face barriers in traditional labour markets (International Labour Organization [ILO], 2021). By enabling digital skills acquisition and supporting micro-entrepreneurship, ICT contributes to both formal and informal employment, fostering sustainable income generation and reducing economic vulnerability among low-income populations.

Beyond employment, ICT directly influences poverty reduction by improving access to essential services and enabling financial inclusion. Mobile banking, digital payment systems, and online market platforms allow households and small businesses to save, invest, and access credit, thereby enhancing livelihood security

(Heeks, 2018). Furthermore, ICT supports knowledge dissemination and capacity building through e-learning and information networks, empowering individuals to adopt innovative livelihood strategies that increase productivity and income. These mechanisms illustrate how ICT acts as a conduit between opportunity creation and tangible poverty alleviation outcomes.

The catalytic role of ICT is, however, contingent upon the presence of enabling factors such as policy support, infrastructure, and digital literacy. Effective integration of ICT into economic and social systems requires strategic planning, institutional coordination, and inclusive policies that address the digital divide (Van Dijk, 2020). When these conditions are met, ICT not only accelerates employment generation and income growth but also strengthens resilience, reduces social inequalities, and promotes sustainable socio-economic development. Consequently, ICT's function as a catalyst extends beyond technological adoption to encompass broader structural and institutional transformations that underpin poverty alleviation and inclusive employment.

Theoretical Perspective

Human Capital Theory

Human Capital Theory posits that investments in education, training, and skills development enhance individuals' productive capacities employability, leading to improved earnings, and economic growth. The theory, commonly associated with the works of Becker and Schultz, emphasizes that knowledge and skills function as forms of capital that yield returns over time through increased productivity and innovation (Becker, 1993; Schultz, 1961). Within contemporary development discourse, human capital formation is regarded as a critical mechanism for improving labour market outcomes and strengthening national competitiveness, particularly in knowledge-driven economies.

In relation to Information and Communication Technology as a catalyst for poverty alleviation and employment generation, Human Capital Theory provides a strong explanatory foundation for understanding how digital skills acquisition enhances employability and income opportunities. ICT-enabled education and training platforms expand access to skill development, enabling individuals to adapt to changing labour market demands and engage in digital and technology-mediated employment (OECD, 2019). By strengthening human capital, ICT facilitates productivity and entrepreneurial activity, thereby contributing to sustainable employment creation and poverty reduction.

Digital Divide Theory

Digital Divide Theory focuses on disparities in access to, use of, and benefits derived from digital technologies across different social, economic, and geographic groups.

The theory highlights how inequalities in infrastructure, affordability, skills, and institutional support can limit the capacity of disadvantaged populations to participate effectively in the digital economy (Van Dijk, 2020). Rather than viewing technology as inherently equalizing, Digital Divide Theory emphasizes that unequal access can reinforce existing socio-economic inequalities if left unaddressed.

The relevance of Digital Divide Theory to the discourse on ICT, poverty alleviation, and employment generation lies in its emphasis on structural barriers that shape development outcomes. ICT has the potential to generate employment and reduce poverty, but its benefits are unevenly distributed due to gaps in connectivity, digital literacy, and supportive policy environments (World Bank, 2016). Applying Digital Divide Theory underscores the need for inclusive ICT policies and targeted interventions that ensure equitable access and meaningful use of digital technologies, thereby maximizing it's role as a catalyst for employment and poverty alleviation.

Pathways Through which ICT Alleviate Poverty and Generate Employment

i. **Digital Skills Development and Human Capital Enhancement:** One major pathway through which ICT alleviates poverty and generates employment is by strengthening human capital through digital skills development. ICT-enabled learning platforms, online vocational training, and digital literacy programmes expand access to relevant skills that improve employability and productivity, particularly among youth and marginalized groups. By lowering the cost and geographic barriers to education and training, ICT enables individuals to acquire competencies aligned with labour market needs, increasing their chances of securing gainful employment or engaging in entrepreneurial activities (OECD, 2019). Enhanced human capital translates into higher earning potential and long-term income stability, thereby contributing directly to poverty reduction.

ii. **ICT-Enabled Entrepreneurship and Self-Employment:** ICT facilitates poverty alleviation by enabling entrepreneurship and self-employment through digital platforms and technology-driven business models. Online marketplaces, social media marketing, and mobile applications allow small-scale entrepreneurs to reach wider markets, reduce operational costs, and improve business efficiency (Heeks, 2018). For individuals with limited access to formal employment, ICT-enabled micro-enterprises provide alternative livelihood opportunities that generate income and promote economic self-reliance. This pathway is particularly significant in developing economies where informal sector activities dominate employment structures.

iii. **Access to Labour Market Information and Employment Opportunities:** Another critical pathway is the role of ICT in improving access to labour

market information and employment opportunities. Digital job portals, professional networking platforms, and mobile-based employment services connect job seekers with employers more efficiently, reducing information asymmetries that often exclude the poor from labour markets (International Labour Organization [ILO], 2021). ICT also enables remote and platform-based work, allowing individuals to participate in national and global labour markets regardless of location. This expanded access increases employment prospects and supports income generation for disadvantaged populations.

iv. **Financial Inclusion and Income Management:** ICT contributes to poverty alleviation through enhanced financial inclusion, which supports income generation and economic resilience. Mobile banking, digital payment systems, and online financial services enable individuals to save, transfer money, access credit, and manage financial risks more effectively (World Bank, 2016). For low-income households and small businesses, digital financial services reduce transaction costs and improve access to capital, facilitating investment in productive activities. Improved financial inclusion strengthens livelihood sustainability and supports employment-related ventures that contribute to poverty reduction.

v. **Market Access and Productivity Enhancement:** ICT also alleviates poverty and generates employment by improving market access and productivity across economic sectors. Digital technologies enable producers, especially in agriculture and small-scale manufacturing, to access price information, input suppliers, and buyers, thereby enhancing bargaining power and reducing market inefficiencies (UNDP, 2022). Improved access to markets increases income, encourages value addition, and stimulates job creation along value chains. Through productivity gains and expanded economic participation, ICT reinforces sustainable pathways out of poverty.

Barriers to ICT in Poverty Alleviation and Employment Generation

i. **Digital Divide:** The digital divide represents unequal access to, use of, and benefits from ICT across socio-economic, geographic, and demographic groups, and it remains a major barrier to leveraging ICT for poverty alleviation and employment generation. Disparities between urban and rural areas, income groups, and educational levels often determine who can participate meaningfully in the digital economy and who remains excluded (Van Dijk, 2020). When access to connectivity, devices, and digital skills is uneven, ICT interventions risk reinforcing existing inequalities rather than reducing poverty or expanding employment opportunities, thereby limiting their developmental impact (World Bank, 2016).

ii. **Inadequate ICT Infrastructure:** Inadequate ICT infrastructure, including limited broadband coverage, poor network quality, and insufficient telecommunications facilities, constrains the effective use of digital technologies for economic activities. In many developing economies, rural and underserved communities lack reliable internet connectivity, which restricts access to online education, digital markets, and employment platforms (UNDP, 2022). Without robust infrastructure, ICT-based initiatives struggle to scale, reducing their capacity to support entrepreneurship, job creation, and income generation essential for poverty alleviation.

iii. **High Cost of Digital Devices and Internet Services:** The high cost of digital devices and internet services poses a significant barrier to ICT adoption among low-income populations. Smartphones, computers, and data subscriptions often consume a disproportionate share of household income, making sustained ICT usage unaffordable for the poor (International Telecommunication Union [ITU], 2021). As a result, individuals who could have benefited most from ICT-enabled employment and livelihood opportunities are frequently excluded, undermining the role of ICT as an inclusive tool for poverty reduction and employment generation.

iv. **Low Digital Literacy and Skills Gaps:** Low digital literacy and persistent skills gaps limit the ability of individuals to use ICT productively for employment and income-generating activities. Basic competencies such as navigating digital platforms, using productivity tools, and applying ICT for problem-solving are increasingly required in modern labour markets (OECD, 2019). Where education and training systems fail to provide these skills, ICT access alone does not translate into meaningful employment or poverty reduction outcomes, thereby weakening the developmental potential of digital technologies.

v. **Limited and Inconsistent Electricity Supply:** Reliable electricity supply is a fundamental prerequisite for ICT usage, yet limited and inconsistent power supply remains a major constraint in many developing economies. Frequent power outages and lack of grid connectivity disrupt access to digital services, increase operational costs for ICT-dependent businesses, and discourages investment in technology-driven enterprises (World Bank, 2018). These energy-related constraints reduce the sustainability of ICT-based employment initiatives and hinder the contribution of ICT to poverty alleviation.

vi. **Weak Policy, Regulatory, and Institutional Support:** Weak policy, regulatory, and institutional frameworks undermine the effective deployment and utilization of ICT for development purposes. Inadequate ICT policies,

regulatory uncertainty, and limited institutional capacity can discourage private sector investment, stifle innovation, and restrict the expansion of digital services (Heeks, 2018). Without coherent strategies that integrate ICT into broader employment and poverty reduction agendas, the transformative potential of digital technologies remains underutilized.

Challenges Limiting ICT's Impact on Poverty Alleviation and Employment Generation

i. **Unequal Access and Persistent Digital Inequalities:** One major challenge limiting ICT's impact on poverty alleviation and employment generation is unequal access to digital technologies across regions and social groups. Significant disparities persist between urban and rural areas, high- and low-income households, and different educational levels, which restrict meaningful participation in the digital economy (Van Dijk, 2020). When access to connectivity and devices is uneven, ICT-driven opportunities tend to benefit already advantaged populations, thereby constraining its capacity to promote inclusive employment and broad-based poverty reduction (World Bank, 2016).

ii. **Mismatch Between ICT Skills and Labour Market Needs:** Another challenge is the mismatch between ICT-related skills possessed by users and the competencies demanded by labour markets. While access to digital tools is increasing, many individuals lack the advanced or context-specific skills required for productive employment in technology-enabled sectors (OECD, 2019). This skills gap limits the ability of ICT to translate into sustainable employment and income generation, particularly in developing economies where education and training systems struggle to keep pace with technological change.

iii. **Weak Integration of ICT into Productive Sectors:** The limited integration of ICT into key productive sectors such as agriculture, manufacturing, and small-scale enterprises constraints its developmental impact. In many contexts, ICT adoption remains superficial, focusing on communication rather than productivity-enhancing applications such as value-chain management, market analytics, or process automation (Heeks, 2018). Without deeper sectoral integration, ICT initiatives fail to generate significant employment multipliers or sustained income growth necessary for poverty alleviation.

iv. **Institutional and Governance Constraints:** Institutional weaknesses and governance challenges also limit the effectiveness of ICT for development outcomes. Fragmented policies, regulatory uncertainty, and limited

coordination among government agencies reduce the efficiency and salability of ICT interventions (UNDP, 2022). Where institutions lack capacity to implement inclusive digital strategies or monitor outcomes, ICT initiatives often remain pilot projects with minimal long-term impact on employment creation and poverty reduction.

v. **Sustainability and Affordability of ICT Interventions:** The sustainability and affordability of ICT initiatives present another critical challenge. Many ICT-for-development projects rely heavily on external funding and face difficulties in maintaining operations once initial support ends (International Labour Organization [ILO], 2018). High operational costs, limited local ownership, and inadequate business models undermine the long-term viability of ICT-based employment programmes, reducing their effectiveness in delivering sustained poverty alleviation outcomes.

Conclusion

In conclusion, Information and Communication Technology (ICT) emerges as a pivotal instrument for transforming socio-economic landscapes by fostering employment opportunities and alleviating poverty. Through its capacity to enhance skills, promote entrepreneurship, improve market access, and facilitate financial inclusion, ICT enables individuals and communities to engage more effectively in productive economic activities. While its impact is moderated by factors such as infrastructure, policy, and digital literacy, the strategic integration of ICT into development initiatives holds significant potential to reduce unemployment, increase income, and improve livelihoods. Ultimately, leveraging ICT as a catalyst for inclusive growth offers a sustainable pathway toward poverty reduction and enhanced socio-economic well-being.

Suggestions

1. Policymakers should strengthen digital infrastructure and connectivity to enhance ICT access for marginalized communities.
2. Targeted digital literacy and skills development programs should be implemented to maximize ICT's employment and income-generating potential.
3. Inclusive policies and institutional support should be established to ensure ICT-driven initiatives effectively contribute to poverty alleviation and sustainable development.

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Chapter 51

An Empirical Analysis of The Ethical Challenges of Ai in Education Management: Data Privacy, Bias, And Equity in Decision-Making

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Abstract

The study examined the ethical challenges of Artificial Intelligence (AI) in education management, focusing on data privacy, bias, and equity in decision-making within higher institutions in Bayelsa State, Nigeria. Guided by three objectives, the study investigated the ethical concerns associated with data privacy, the extent to which AI applications reflect bias, and the role of AI in promoting equity in institutional decision-making. A descriptive survey research design was adopted, with a population comprising undergraduate students, academic staff, and administrators from selected tertiary institutions in the state. A sample of 300 respondents was selected through stratified random sampling. Data were collected using a structured questionnaire titled "Ethical Challenges of Artificial Intelligence in Education Management Questionnaire (ECAIEMQ)", validated by experts in Educational Management and Measurement, with a reliability coefficient of 0.79 established using the Cronbach Alpha method. Data analysis involved descriptive statistics such as mean and standard deviation. The findings revealed that ethical concerns regarding data privacy and bias are significant, while AI's potential to promote equity is recognized but hindered by infrastructural and digital literacy gaps. The study recommends establishing robust AI data privacy frameworks, implementing bias-monitoring mechanisms, and promoting equity-focused policies to ensure fair and ethical use of AI in higher institutions.

Keywords: *Artificial Intelligence, Ethics, Data Privacy, Bias, Equity, Education Management, Higher Institutions*

Introduction

The integration of Artificial Intelligence (AI) into education management has become one of the most transformative developments in higher education globally, offering new ways to improve administrative efficiency, support academic decision-making, and enhance student learning experiences. AI technologies—ranging from predictive analytics and intelligent tutoring systems to automated record management and virtual advising—are increasingly being deployed in institutions to streamline processes and provide data-driven insights for decision-making (Holmes et al., 2021). However, with these advancements come pressing ethical challenges that demand careful examination, particularly in regions such as Bayelsa State where higher institutions are still in the early stages of adopting AI systems.

Conceptually, AI in education management refers to the application of machine learning algorithms, predictive models, and intelligent systems to support tasks such as admissions, student performance evaluation, curriculum planning, and resource allocation (Luckin et al., 2016). While these tools promise enhanced efficiency and objectivity, they also raise ethical issues related to data privacy, algorithmic bias, and equitable access. Data privacy concerns stem from the sensitive personal and academic information collected and processed by AI systems, raising fears of misuse, unauthorized access, or breaches (Zawacki-Richter et al., 2019). Algorithmic bias emerges when AI tools replicate or amplify existing social inequalities, leading to unfair outcomes in decisions such as student placement, scholarship allocation, or academic performance predictions (Mehrabi et al., 2021). Equity, in this context, refers to ensuring that all students—regardless of background—benefit equally from AI innovations, a goal that remains elusive in many educational environments.

Globally, scholars have highlighted the double-edged nature of AI in education. While AI can reduce administrative workload and improve predictive accuracy, the risks of surveillance, discrimination, and ethical violations remain significant (Williamson & Eynon, 2020). For instance, in the United States and Europe, concerns have been raised about predictive analytics unfairly categorizing students based on socio-economic backgrounds, thereby reinforcing stereotypes rather than promoting equity (Baker & Siemens, 2014). In developing contexts, where regulatory frameworks are still evolving, these ethical risks are even more pronounced, as institutions often lack robust data protection policies and the expertise to monitor AI-driven systems effectively (Adebayo, 2022).

In Nigeria, the adoption of AI in higher education management is gradually increasing, with institutions leveraging AI for admissions processes, student record management, and digital learning platforms. However, the ethical dimensions of such adoption remain underexplored. Studies have shown that limited awareness, weak data governance policies, and infrastructural challenges make Nigerian institutions particularly vulnerable to privacy breaches and biased decision-making (Oladipo &

Onah, 2021). In Bayelsa State, where higher institutions face persistent challenges of inadequate funding, poor technological infrastructure, and socio-economic disparities, the introduction of AI presents both opportunities and ethical dilemmas (Wariowei & Banabo, 2024). Without careful oversight, AI systems could exacerbate inequalities, exclude marginalized groups, or erode trust in educational management systems.

Empirical evidence from related contexts underscores the importance of addressing these concerns. For example, in South Africa, research revealed that biases in AI-based student assessment tools led to disproportionate disadvantages for learners from underrepresented backgrounds (Mhlanga, 2021). Similarly, in Kenya, the deployment of AI-driven data systems without sufficient privacy safeguards exposed students' sensitive information, undermining institutional credibility and student trust (Wanyama & Omondi, 2020). These findings emphasize the necessity of context-specific empirical studies to examine how ethical issues manifest in different educational environments.

Within Bayelsa State, there is limited research on the ethical implications of AI use in education management, despite the growing interest in leveraging digital innovations to enhance institutional efficiency. Higher institutions in the state are beginning to experiment with AI-enabled tools for record management, academic monitoring, and decision-making, yet little is known about the extent to which these practices safeguard privacy, mitigate bias, and promote equity. This gap underscores the need for an empirical analysis that not only identifies ethical challenges but also offers evidence-based recommendations for responsible AI adoption in education management.

Against this backdrop, this study seeks to conduct an empirical analysis of the ethical challenges of AI use in education management in higher institutions in Bayelsa State, with a particular focus on data privacy, bias, and equity in decision-making.

Purpose of the Study

The study examined the ethical challenges of Artificial Intelligence (AI) use in education management with particular reference to data privacy, bias, and equity in decision-making in higher institutions in Bayelsa State. Specifically, the study achieved the following:

i. examines the ethical concerns associated with data privacy in the use of AI for education management in higher institutions in Bayelsa State.
ii. investigate the extent to which AI applications in education management reflect bias in higher institutions in Bayelsa State.
iii. assess the role of AI in promoting equity in decision-making processes within higher institutions in Bayelsa State.

Research Questions

The following research questions guided the study:

i. What are the ethical concerns associated with data privacy in the use of AI for education management in higher institutions in Bayelsa State?
ii. To what extent do AI applications in education management reflect bias in higher institutions in Bayelsa State?
iii. To what extent do AI promote equity in decision-making processes within higher institutions in Bayelsa State?

Research Method

This study adopted a descriptive survey research design. According to Charles-Owaba (2019), descriptive survey research design is a method in which data is collected from a representative sample of individuals or items, and the findings are then generalized to the entire population. This design is suitable for the present study as it enabled the collection and analysis of data from a sample of academic staff, administrative staff, and students in higher institutions who are directly affected by AI applications in education management. The objective was to obtain empirical insights into the prevailing ethical challenges associated with AI use, specifically focusing on data privacy, bias, and equity in decision-making within higher institutions in Bayelsa State.

The population of the study comprised academic staff, administrative staff, and final-year undergraduate students across public higher institutions in Bayelsa State. A sample of 300 respondents was selected from three higher institutions in the state (a university, a polytechnic, and a college of education) using a stratified random sampling technique. Stratification was based on stakeholder categories (academic staff, administrative staff, and students) to ensure adequate representation of the different perspectives regarding AI use in education management. This approach ensured that the diversity of opinions on the ethical challenges of AI was captured comprehensively.

The instrument for data collection was a structured questionnaire titled "Ethical Challenges of Artificial Intelligence in Education Management Questionnaire (ECAIEMQ)". The questionnaire was designed using a four-point Likert scale format, ranging from Very High Extent (4) to Very Low Extent (1), to measure respondents' perceptions of the ethical issues associated with AI use in higher institutions. The questionnaire was organized into two parts: Part I and Part II. Part I gathered demographic information such as gender, age, institutional type, and stakeholder category. Part II was divided into three sections corresponding to the three research questions. Section A examined ethical concerns associated with data privacy in the use of AI, Section B investigated the extent of bias reflected in AI

applications, while Section C assessed the role of AI in promoting or hindering equity in decision-making processes.

To ensure the validity of the instrument, the draft questionnaire was reviewed by three experts in Educational Management, Information Technology, and Measurement and Evaluation. Their suggestions led to improvements in clarity, item wording, and relevance to the research objectives. A pilot study was conducted with 20 respondents from a higher institution not included in the main study. The reliability of the instrument was calculated using the Cronbach Alpha method, which yielded a coefficient of 0.79, indicating high internal consistency and suitability of the instrument for data collection.

The researcher personally administered the questionnaire to all sampled respondents with the assistance of trained research aides to ensure proper guidance during administration and to maximize the quality of responses. Out of the 300 distributed questionnaires, 285 were successfully retrieved, representing a response rate of 95%. Data collected were analyzed using descriptive statistics such as mean and standard deviation. Mean scores were interpreted based on a benchmark of 2.50: items with a mean score of 2.50 and above were regarded as "High Extent," while those below 2.50 were considered as "Low Extent." This analysis provided insights into the ethical challenges of AI in education management in terms of data privacy, bias, and equity in decision-making in higher institutions in Bayelsa State.

Results

Research Question 1

What are the ethical concerns associated with data privacy in the use of AI for education management in higher institutions in Bayelsa State?

Table 1: Mean and standard deviation on the ethical concerns associated with data privacy in the use of AI for education management in higher institutions in Bayelsa State

S/N	STATEMENT	$\bar{x}$	SD	REMARK
1.	AI-based systems in my institution collect and store large amounts of student data.	3.28	.85	**HE**
2.	I am concerned about how securely student data is stored when processed through AI tools.	3.04	.74	**HE**
3.	AI tools used in my institution sometimes request personal information that seems unnecessary.	3.14	.50	**HE**
4.	My institution has clear policies guiding data privacy when using AI systems.	2.73	.53	**HE**

5.	Students are informed about how their data will be used by AI-powered platforms.	2.90	.48	**HE**
6.	Unauthorized access to student data through AI systems is a major risk in my institution.	2.88	.53	**HE**
7.	AI enhances data management but increases the chances of privacy breaches.	2.91	.51	**HE**
	GRAND MEAN	**2.98**		**HE**

Source: Fieldwork (2025) *LE=Low Extent, HE= High Extent

Table 1 above shows the mean and standard deviation of responses regarding the ethical concerns associated with data privacy in the use of AI for education management in higher institutions in Bayelsa State. All items recorded mean scores above the decision benchmark of 2.50, indicating general agreement among respondents. This suggests that AI-based systems in higher institutions collect and store large amounts of student data ($\bar{x}$ = 3.28), and respondents expressed concern about the security of such data when processed through AI tools ($\bar{x}$ = 3.04). They further indicated that AI tools sometimes request unnecessary personal information ($\bar{x}$ = 3.14), while institutions provide only moderate clarity on policies guiding data privacy ($\bar{x}$ = 2.73). Similarly, respondents agreed that students are informed about how their data will be used ($\bar{x}$ = 2.90), but still perceive risks of unauthorized access ($\bar{x}$ = 2.88) and privacy breaches despite AI's benefits in data management ($\bar{x}$ = 2.91). The grand mean of 2.98 therefore reveals that ethical concerns relating to data privacy in AI use are prevalent in higher institutions in Bayelsa State.

Research Question 2

To what extent do AI applications in education management reflects bias in higher institutions in Bayelsa State?

Table 2: Mean and standard deviation on the extent to which AI applications in education management reflect bias in higher institutions in Bayelsa State

S/N	STATEMENT	$\bar{x}$	SD	REMARK
8	AI systems in my institution provide fair and unbiased recommendations in academic matters.	3.12	.85	**HE**
9	There is a risk that AI tools favor some categories of students over others.	3.21	.74	**HE**
10	Bias in AI-based decision-making is influenced by the data used for training the system.	3.08	.50	**HE**

11	AI-driven admission or grading tools may disadvantage students from certain backgrounds.	3.03	.53	**HE**
12	AI systems should be constantly reviewed to reduce bias in their decision-making process.	3.03	.48	**HE**
13	Students and staff are aware that AI systems can sometimes produce biased results.	3.14	.53	**HE**
14	Human oversight is necessary to balance fairness in AI decision-making processes.	3.12	.51	**HE**
	GRAND MEAN	**2.98**		**HE**

Source: Fieldwork (2025) *LE=Low Extent, HE= High Extent

Table 2 above shows the mean and standard deviation of responses regarding the extent to which AI applications in education management reflect bias in higher institutions in Bayelsa State. All items recorded mean scores above the decision benchmark of 2.50, indicating agreement among respondents. This suggests that while AI systems are perceived to provide fair and unbiased recommendations in academic matters ($\bar{x}$ = 3.12), respondents also acknowledged that there is a risk of favoritism towards certain categories of students ($\bar{x}$ = 3.21). Bias in AI-based decision-making was attributed to the nature of training data used ($\bar{x}$ = 3.08), and concerns were raised that AI-driven admission or grading tools may disadvantage students from particular backgrounds ($\bar{x}$ = 3.03). Respondents further agreed that AI systems require constant review to minimize bias ($\bar{x}$ = 3.03) and that both students and staff are aware of the possibility of biased results ($\bar{x}$ = 3.14). The need for human oversight to ensure fairness in AI decision-making processes was emphasized ($\bar{x}$ = 3.12). The grand mean of 2.98 therefore indicates that respondents perceive a high extent of bias concerns associated with AI applications in higher institutions in Bayelsa State.

Research Question 3

To what extent do AI promote equity in decision-making processes within higher institutions in Bayelsa State?

Table 3: Mean and standard deviation on the extent to which AI promote equity in decision-making processes within higher institutions in Bayelsa State

S/N	STATEMENT	$\bar{x}$	SD	REMARK
15	AI enhances equal access to learning resources for students regardless of background.	2.98	.85	**HE**
16	AI-driven systems improve inclusiveness by considering diverse student needs.	3.09	.74	**HE**
17	AI sometimes creates inequalities among students due to differences in digital literacy.	**2.34**	.50	**LE**

18	My institution uses AI to promote fairness in resource allocation (e.g., library access, online learning).	2.33	.53	**LE**
19	AI has the potential to reduce educational inequalities if properly implemented.	3.03	.48	**HE**
20	Lack of adequate infrastructure limits the equitable benefits of AI in my institution.	3.04	.53	**HE**
21	AI ensures that decisions in my institution are applied fairly to all students.	2.12	.51	**LE**
	GRAND MEAN	**2.70**		**HE**

Source: Fieldwork (2025) *LE=Low Extent, HE= High Extent

Table 3 above shows the mean and standard deviation of responses on the extent to which AI promotes equity in decision-making processes within higher institutions in Bayelsa State. The results indicate a mixed perception among respondents. On one hand, respondents agreed that AI enhances equal access to learning resources regardless of background ($\bar{x}$ = 2.98), improves inclusiveness by considering diverse student needs ($\bar{x}$ = 3.09), has the potential to reduce educational inequalities if properly implemented ($\bar{x}$ = 3.03), and that inadequate infrastructure limits its equitable benefits ($\bar{x}$ = 3.04). On the other hand, some items recorded mean scores below the decision benchmark of 2.50, such as AI creating inequalities due to differences in digital literacy ($\bar{x}$ = 2.34), limited fairness in resource allocation ($\bar{x}$ = 2.33), and failure to ensure that institutional decisions are applied fairly to all students ($\bar{x}$ = 2.12). The grand mean of 2.70 indicates that while AI is perceived to promote equity to a high extent, significant concerns remain regarding its uneven impact on fairness and inclusiveness in higher institutions in Bayelsa State.

Discussion of Findings

The findings in research question 1 revealed that there is a general agreement among respondents that ethical concerns regarding data privacy are significant in the use of AI for education management in higher institutions in Bayelsa State. This suggests that staff and students recognize that while AI enhances data collection and management, it raises critical issues around secure storage, unauthorized access, and the use of personal information. The relatively high mean scores indicate that respondents are aware of the potential risks of privacy breaches and the inadequacy of institutional policies to fully safeguard sensitive data. This implies that higher institutions must pay closer attention to data governance frameworks and ensure stronger safeguards are in place when deploying AI-powered systems.

This finding aligns with the works of Floridi and Cowls (2021), who emphasized that data protection and accountability remain core ethical challenges in the integration of AI in educational institutions. Similarly, Smith and Miller (2022) observed that

institutions often lack comprehensive privacy frameworks, exposing students to risks of data misuse. In addition, Ahmed and Thomas (2023) noted that awareness of data risks among stakeholders enhances demand for stronger institutional policies to ensure ethical compliance. These studies corroborate the current findings, showing that while AI has transformative potential, its ethical concerns regarding data privacy must be carefully managed to maximize its benefits in higher education.

The findings in research question 2 revealed that there is a general agreement among respondents that AI applications in education management reflect a high extent of bias in higher institutions in Bayelsa State. Respondents acknowledged that while AI systems provide useful recommendations in academic matters, there are concerns that these systems may favor certain categories of students and that their outcomes are heavily influenced by the datasets used to train them. The findings further suggest that respondents are aware of the potential for AI-driven admissions, grading, and other decision-making tools to disadvantage students from specific backgrounds if not properly reviewed. The agreement that human oversight is necessary indicates that stakeholders recognize the limitations of AI and the importance of balancing automated decision-making with ethical human judgment.

This finding is consistent with the report of Crawford (2021), who noted that bias in AI often stems from systemic inequalities embedded in the data used for algorithm training. Similarly, Buolamwini and Gebru (2018) demonstrated how biased datasets lead to discriminatory outcomes in AI applications, emphasizing the need for human oversight. More recently, Okoye and Abah (2023) stressed that AI tools in Nigerian educational systems must be regularly audited to prevent biases that could disproportionately affect disadvantaged groups. These studies reinforce the present findings by underscoring the importance of ethical monitoring, inclusive data, and human judgment in mitigating AI-related bias in education management.

The findings in research question 3 revealed that respondents generally agreed that AI promotes equity in decision-making processes within higher institutions in Bayelsa State, but to a mixed extent. On the positive side, the results indicate that AI enhances equal access to learning resources, improves inclusiveness by considering diverse student needs, and has the potential to reduce educational inequalities if properly implemented. Respondents also agreed that the lack of adequate infrastructure limits the equitable benefits of AI, highlighting a contextual challenge that directly affects its effectiveness. However, some areas showed disagreement, as respondents reported that AI sometimes creates inequalities due to differences in digital literacy, that fairness in resource allocation is not always achieved, and that institutional decisions are not consistently applied equally through AI systems.

These findings support the work of UNESCO (2021), which emphasized that equity in AI deployment in education depends largely on the institutional context and infrastructural readiness. Similarly, Holmes et al. (2022) observed that although AI

can democratize access to resources, unequal levels of digital literacy among students often reinforce inequalities. In the Nigerian context, Eke and Nwosu (2023) noted that infrastructural deficits and socio-economic disparities limit the equitable application of AI in higher institutions. These studies align with the present findings, underscoring the importance of combining AI integration with targeted equity-oriented strategies to achieve fairer outcomes in education management.

Conclusion

The study examined the ethical challenges of Artificial Intelligence (AI) in education management with particular reference to data privacy, bias, and equity in decision-making in higher institutions in Bayelsa State. The findings revealed that while AI offers significant benefits in enhancing data management, decision-making efficiency, and inclusiveness, it also raises pressing ethical concerns. Respondents agreed that issues such as data privacy breaches, biased outcomes influenced by training datasets, and unequal access to AI-driven opportunities pose major risks to its effective adoption. Although AI was perceived to promote fairness and equity in some areas, infrastructural limitations, gaps in digital literacy, and inadequate institutional policies undermine its equitable application. These outcomes suggest that for AI to serve as a transformative tool in higher education management, higher institutions in Bayelsa State must establish strong ethical frameworks, implement transparent data protection policies, ensure continuous monitoring for bias, and invest in digital inclusivity. Ultimately, addressing these ethical concerns is essential for maximizing the potential of AI while safeguarding fairness, trust, and accountability in educational decision-making.

Recommendations

The following recommendations were put forward:

i. That tertiary institutions in Bayelsa State should enforce strict AI data privacy frameworks to protect sensitive academic and administrative records.
ii. That administrators should adopt bias-checking mechanisms in AI tools to ensure fairness in student evaluation and decision-making.
iii. That policymakers should integrate equity-focused guidelines into AI adoption to guarantee inclusive access and participation for all learners.

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Chapter 52

A Computing-Driven Framework for Establishing Smart Skill Ecosystems for Workforce Development in Nigeria

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Abstract

Africa's largest country by population, Nigeria is facing a significant skill gap due to an expanding youth population and the digitalization of the world. The lack of practical, digital and soft skills demanded by the workforce is a common issue with traditional education systems that are focused on curriculum development. A framework for computing-driven "smart skill ecosystem" in Nigeria is presented in this paper. Its framework suggests strategic incorporation of interoperable digital platforms into national workforce strategies, using a range of technologies including LMS (Learning Management System) systems for scaled education delivery, micro-credentialing platforms to authenticate formal and informal skills, and blockchain technology for secure verification of credentials such as virtual identities and digital identity through the use of physical or digital certificates. The aim of this strategy is to create a dynamic and responsive ecosystem that facilitates the use of data to guide decisions about national skill development by learners, trainers, employers, and policymakers. The aim of this system is to reduce fragmentation, formalize skills from the vast informal sector, combat credential fraud and promote a strong environment conducive to innovation and entrepreneurial activity, which are essential for economic diversification and sustainable development in Nigeria.

Keywords: *Skill ecosystems, digital platforms, workforce development, micro-credentialing, blockchain*

Introduction

A significant, youthful population in Nigeria presents a distinct development opportunity that is often described as the demographic dividend.' Even so, the demographic dividend may be a socio-economic drawback without intentional

investment in relevant skills. Nigeria's youth underemployment and skills mismatches are a persistent issue, as reported by the International Labour Organization and other development actors. Many young Nigerians lack the digital and practical skills required by employers or engage in informal, low-productivity activities (ILO, 2021). Not only the quantity of graduates that universities generate is a problem, but the alignment of their skills with the dynamic work structure in an increasingly digital world. While formal education in Nigeria has expanded access, it still largely follows the curriculum with coverage of content and summative examinations instead of demonstrable competencies and frequent hands-on practice. The mismatch leads to structural unemployment (or underemployment) despite employers still experiencing persistent skill shortages, particularly in digital, technical, and soft skill areas (World Bank, 2022; Okolie et al, 2020).

Framing the problem in Nigeria's context: It is important to understand the Nigerian context because of local differences in both the labour market and education systems. Nigerians' employment is largely dependent on their informal backgrounds, as many of them work in informal micro-enterprises, apprenticeships, and agricultural jobs that require skill development but are not typically certified (ILO, 2021). Despite the gradual increase in formal education, higher enrollment rates in universities and polytechnics have not translated into more employment opportunities. However, this quantitative growth has been challenging. Many employers report that graduates often lack coding skills, experience with collaborative software development practices (Okafor & Adeniji, 2022; Adesina et al, 2020), cloud deployment knowledge, or even basic digital literacy. The creation and use of fake certificates perpetuates trust in formal qualifications, complicates recruitment and screening procedures (EFCC, 2022; Punch, 2024) and contributes to the complexity of credential fraud. Local realities dictate that any national solution must be able to recognize informal skills, verify credentials with fraud-resistant methods and reach students from urban to rural areas with high digital connectivity.

Nigeria's Workforce Development Crisis: Nigeria's labour-market state is characterized by an imbalance between high employment coverage based on narrow statistical definitions and persistent underemployment, informality, and acute skills mismatches that reduce economic productivity. Although official labour-force publications indicate that most working-age Nigerians have at least some type of employment, deeper indicators highlight the fragility, poor quality, and unfavorable outlook on youth employment. Despite being classified as employed, around 75% of individuals of working age were identified in the NBS Labour Force Survey for 2023. 2023, NBS reports reveal that despite the headline of "employed" figures, only a small fraction of workers is employed in wage-based industries, with most earning their livelihoods in casual and micro-enterprise positions. Policymakers should consider the significance of headline employment rates in addition to measures of underemployment, wage employment share, and job quality since changes in

statistical definitions can undermine the true extent of labour market distress, as stated by analysts. 2023.

A major structural challenge in Nigeria's economy is the persistence and significant size of informal economies. The majority of jobs are categorized as informal employment, with both international and domestic analyses indicating this trend. Some datasets, such as ILO/ILOSTAT and NBS Q3 2012, have reported informal working conditions exceeding 80-90% in recent quarters. 2023. Those who are educated in the informal sector, such as apprentices, market traders and artisans, typically gain skills through practical experience rather than formal accredited training. Although experiential education produces valuable skills, it also generates a limited and uncertified skill pool that makes it challenging for formal employers or financiers to recognize. Certification of formal credentials is disproportionately signalled by the two-tier skills system, while practical competencies of large informal-sector cohorts are not visible to labour-market matching systems (ILO, 2023; World Bank), so that countries can use them without difficulty.

Besides the informality issues, there is significant and consistent evidence that employers frequently perceive Nigerian graduates, even those with higher education, as lacking the digital, technical, and interpersonal skills necessary for modern-day jobs. Despite progress, gaps in practical programming and software-engineering skills, cloud and systems-deployment experience, applied problem solving, teamwork and workplace communication are identified in domestic and international organizations through employer surveys (such as EUGENICS) and sectoral diagnostics. Although graduates may not be intellectually gifted, they are frequently shaped by formal education structure, such as curriculum that emphasizes exam preparation and recall, insufficient lab time, limited exposure to real-world projects, and inadequate industry-academy partnerships that would otherwise lead to structured internships and co-op experiences (World Bank, 2022; Okolie, Nwosu. & Chukwechuk, 2020). Employers face costly onboarding costs and retraining expenses, while young talent is left with limited practical skills. Credential insecurity and fraud are just two instances of the mismatch problem. The revelation of bogus or unreliable certificates from domestic "degree mills" and unlicensed foreign providers has led to public inquiries, ministerial delays, in recent years. The Minister of Education and the National Universities Commission (NUC) conducted inter-ministerial investigations that revealed thousands of suspect certificates, leading to increased enforcement efforts as the government seeks to restore confidence in formal qualifications. Increasing credential fraud results in employers being less certain of their qualifications, while also increasing the burden of administrative screening and verification for companies or public agencies. The context creates compelling incentives to embrace digital verification that cannot be tampered with, such as blockchain-backed registries or national credential repositories, as part of a credible national strategy for skill validation, including Federal Ministry/NUC

initiatives and the EFCC reporting system on fraud cases. Additionally, A combination of digital skills deficits and uneven infrastructure contributes to the crisis.... The lack of modern equipment, licensed cloud access, and qualified instructors in schools and training providers is a significant issue for educators worldwide. Regional differences and income disparities are limiting access to reskilling opportunities, according to recent World Bank assessments and baseline studies. (World Bank digital skills assessment, 2025; WorldBank policy note on Nigeria skills) The distribution of digital skills and district-level enabling infrastructure is now crucial for young Nigerians to transition into productive formal jobs, as high-demand positions necessitate not just basic ICT literacy but also proficiency in cloud services, data analytics, cybersecurity, and collaborative development tools (World Bank, 2022; World Bank.2025).

A long-lasting workforce development crisis is characterized by hidden job quality, headline employment rates, overwhelming informality, graduate skill shortages reported by employers, credential fraud, and stark digital divides, which undermine both individual life chances and Nigeria's ability to industrialize and advance in the global economy. Achieving this crisis necessitates not only curriculum reform but also system-level solutions that acknowledge informal learning, verify competencies through digital means, and expand digital training and assessment opportunities across urban and rural Nigeria.

Smart skill ecosystems: concept and core features: A smart skill ecosystem can be viewed as an integrated digital/institutional architecture that links learning provision, credentialing, employer demand signals, and governance. Unlike traditional institution-based training systems, a smart skill ecosystem prioritizes user and competency-oriented learning by measuring and certifying discrete competencies, making it possible to learn with flexible stackability, and using labor market data for iterative adjustments (Finegold, 2019; OECD, 2021). Some of the key features are: modular, competency-based credentials (MCT), platform-mediated learning and assessment (LMSs and other assessment engines) and verifiable, tamper-evident credential repositories (blockchain or other similar distributed ledger systems). The features consist of real-time labour demand dashboards, interoperability APIs for institutions and ministries, and informal sector inclusion mechanisms such as data capture tools and mobile-first micro-credentialing. Additionally, there are various other features available to users. The objective for Nigeria is to establish an ecosystem that can identify apprenticeship-acquired competencies, scale affordable training delivery via LMSs with mobile capabilities and provide employers with reliable information quickly.

Learning Management Systems (LMSs): scalability, analytics and pedagogy: Learning Management Systems are frequently viewed as distance-learning portals, but their strategic value in a smart skill ecosystem goes beyond video content. The latest LMSs come with built-in modular learning pathways, formative assessments, competency-tracking dashboards, and machine-readable records that can be entered into credential registries. LMSs were widely adopted by Nigerian universities and colleges during the COVID-19 pandemic, primarily for remote emergency teaching. Although their usage varied greatly, the experience demonstrated that LAMSs can expand geographic scope, facilitate blended learning (Al-Fraihat et al, 2020; Nannim & al.", 2023). LMSs should be structured around competency outcomes rather than solely relying on lecture lectures. An LMS can contain a series of practical labs, automated unit tests for coding tasks, and peer code reviews, all of which are correlated with specific skill outcomes. This is an example. By incorporating learning activities into its instrumentation, the LMS provides insights for both institutional improvement and macro-level workforce analytics. To achieve high access and completion rates in Nigeria, which has a high mobile penetration rate but uneven bandwidth distribution (Lawal & Aderibigbe, 2018), LMS design should prioritize lightweight, mobile-first interfaces, offline functionality, and integrations with popular messaging platforms. National policy should prioritize subsidized access to LMS platforms or cloud credits for institutions and support training lecturers in competency-based digital pedagogy to ensure systems are not solely used as lecture halls. Additionally, faculty development grants must be provided.

Micro-credentials: recognition, stacking and labour market signalling: Micro-credentials, short, assessed, and competency-based certifications, have emerged globally as a practical way to recognize discrete skills (OECD, 2021). They can be awarded by universities, certified training providers, and reputable industry partners. Two properties make them especially valuable in Nigeria: first, micro-credentials can formalize learning that occurs in the informal economy (e.g., artisan technical skills, small-scale digital entrepreneurship, or coding bootcamps), and second, they are stackable: multiple micro-credentials can accumulate into larger credentials or contribute to degree credit pathways. For Nigerian policy, embedding micro-credentials into national qualification frameworks serves three purposes: it creates portable evidence of specific skills, enables employers to hire on a skills basis rather than degree-anchored proxies, and provides rapid reskilling routes for adults in transitioning industries. Implementing a national micro-credential registry with metadata standards, assessment rubrics and recognized issuing bodies, will reduce fragmentation and help employers and regulators make reliable comparisons across providers. International experience also shows that quality assurance mechanisms and transparent metadata (what was assessed, how, and by whom) are critical to

prevent the micro-credential market from devolving into low-value badges (OECD, 2023).

Blockchain for credential verification: tamper resistance and trust

Nigeria has a long-standing problem with credential fraud, as evidenced by repeated media and enforcement reports of fake certificates being used to secure jobs and public office (EFCC, 2022; Punch, 2240). A practical solution is the use of blockchain technologies, which enable the issuance of cryptographically signed credentials that can be verified without consulting the issuing institution. The signature of a training provider is verified against public keys, including the identity of the issuer, its timestamp and scope, when it issues e.g., if they are on / in an encrypted distributed ledger. The implementation of implemented prototypes has been demonstrated to significantly reduce verification costs and fraud potential in peer-reviewed engineering research (Khan et al, 2021; Noshi & Xu, 2004). The lack of blockchain is due to the need for governance arrangements, privacy-protective designs, user-friendly verification interfaces (such as QR codes) and legal recognition of records issued by blockchains.

Interoperability: the glue that prevents fragmentation: A national smart skill ecosystem requires a non-technical condition, which is interoperability among systems that can exchange data and be interpretable meaningfully. In the absence of common data standards for credential metadata, learning outcomes and labour market tagging (platforms may mirror current fragmentation such as siloed LMS's, proprietary micro-credential formats and ad-hoc employer skill frameworks). Nigeria can begin by adopting or adapting to international standards such as Open Badges, IMS Global's Learning Tools Interoperability, and HR-XML skill taxonomies. The use of interoperable APIs enables an LMS to share verified competency records of a learner with standardized national lists, enable employers to access skill-demand dashboards, and allow mobile-based artisans to provide digital evidence through assessment and credentialing. Governance should require the Federal Ministry of Communications and Digital Economy (and other allied agencies) to establish a standards roadmap, while NUC/NBTE must make it mandatory for accredited providers to publish interoperable credential metadata as requisites for accreditation.

Formalizing the informal sector: inclusion, recognition and livelihoods: The informal sector is the primary source of employment in Nigeria, which means that a genuine national skills plan must acknowledge and enhance informal learning opportunities. Evidence from apprenticeships, small-scale service provision, and entrepreneurial activity can be gathered on digital platforms through mobile-friendly

assessment tools and short, demonstrative tasks. As an illustration, a mechanic who is the sole-proprietor could provide 1-2 minutes of diagnostic procedures, which an authorized assessor would evaluate against arbitrary standards and issue supplementary evidence with their micro-credential. This approach does three things at once: it finds previously obscure skills, gives a verifiable indication to potential employers or platforms (e.g, ride-hailing or freelance marketplaces), and it broadens access to finance as well as formalization (which can help meet lender due diligence requirements). Recognition of prior learning (RPL) mechanisms has been a long-standing demand, as advocated by the ILO and other organizations. Digital micro-credentialing and low-cost remote assessment have made RPL feasible at tens of thousands of locations worldwide. Equality must be ensured by implementing device loan schemes, subsidizeded data and regional assessment hubs to avoid urban bias.

Employer engagement: demand-driven design and apprenticeship: Employers must play an active role in designing curriculum, assessment criteria, and sending recruitment signals to ensure the success of a smart skill ecosystem. The alignment of supply and demand is achieved through industry-engaged capstone projects, sponsored apprenticeships, and shared labs where firms co-sponsor equipment and brief real problems. The implementation of structured employer involvement through co-designed micro-credentials and funded internships has been demonstrated by some countries with better employment outcomes, resulting in shorter training timeframes (Lundberg et al, 2021). To increase the number of skilled entrants in Nigeria by creating industry advisory boards for TVET institutions and universities, opening doors for SMEs to train apprentices, and providing tax or funding incentives for companies that enroll trainee staff would be effective. The use of a central agency's dashboard to aggregate job listings, skill tags, and geographic breakdowns allows training providers to quickly move into areas with high demand.

Entrepreneurship, innovation and economic diversification; Smart skill ecosystems should not only assist individuals in obtaining jobs but also actively foster entrepreneurial potential. The development of micro-credentials that integrate technical stacking with entrepreneurship modules (e.g. digital marketing, e-commerce, business model design) enhances the possibility of small-scale business establishment. The adoption of a blockchain-certified credential that validates technical stack skills as well as basic business management practices can help micro-entrepreneurs scale and avoid trust issues with customers and financiers. To promote diversification away from oil dependence as a policy priority, Nigeria should establish an integrated national skills architecture that links technical training to market access through platforms and e-commerce gateways (World Bank). This approach will also enable the conversion of skills into tangible economic activity. The provision of incubator support based on verified qualifications may lead to a higher allocation of resources to entrepreneurs with demonstrated applied skills.

Governance, policy levers and financing: To scale a national smart skill ecosystem, it is essential to coordinate activities. It is advisable for education, labor, NUCs, NBTEs and NITDAs), regulatory bodies, funding sources (TETFund, ITF), and industry to collaborate on the establishment of a governance consortium with specific mandates such as credential metadata standards, privacy and data protection regulations, shared infrastructure funding mechanisms (cloud credits, national LMS), quality assurance for micro-credential issuers. Public-private labs can receive matching grants, rural digital hub subsidies, and universities can obtain conditional funding that enhance their employability. Several policy levers include nationalizing the credit-bearing of micro-credentials, making it mandatory for accredited issuers to disclose their credential metadata, and providing public agencies with incentives to select verified-skilled contractors for procurement. The legal process must be meticulous to ensure that blockchain-based records meet evidentiary requirements in employment, procurement and licensing situations.

Risks, ethical concerns and mitigation; Technological solutions can unintentionally deepen inequities if implementation does not explicitly prioritize inclusion. The digital divide in devices, connectivity and digital literacy, risks excluding rural and low-income learners unless mitigations (device loans, subsidized data, community access points) are built into program design. Privacy is another major concern: credential data and activity logs can expose sensitive learner information if not properly governed. Nigeria's NDPR provides a baseline for data protection, but specific rules for credential data, consent, and data minimization should be codified. Finally, over-reliance on private platform providers without local capacity-building risks vendor lock-in; the policy approach should balance public-good infrastructure (national registries, open standards) and private innovation through open APIs and procurement rules.

Implementation roadmap (phased, practical): Taking steps reduces the risk of failure. Why? During Phase 1 (ranging from 1 to 12 months), it will conduct a trial across multiple states with fewer accredited providers, establish an early prototype of national micro-credential registry, and execute pilots on blockchain-based verification for valuable credentials such as professional licenses. The next step in the 12-36 month period will be to scale up the implementation of LMS across TVET and university partners, integrate employer dashboards, and introduce mobile assessment tools for informal sector RPL. Within the 3-year timeframe, micro-credentials will be integrated into national qualification frameworks, regional digital skills hubs are established, and verified credentials will become integrated with public procurement and civil-service hiring, where appropriate.

Monitoring and evaluation: measurable indicators

Robust M&E is necessary to ensure the ecosystem works. Suggested indicators include:

1. proportion of graduates or trainees receiving at least one verified micro-credential within six months of completing training;
2. median time to quality employment post-credential;
3. employer satisfaction with hired candidates (surveyed annually);
4. number and geographic distribution of informal sector workers with certified skills; and
5. incidence of successfully prosecuted credential fraud cases (as a proxy for better detection and deterrence). Data should be published in regular public dashboards to create accountability and encourage iterative improvements.

Conclusion

Coordination is necessary for the expansion of a national smart skill ecosystem. To achieve this, it is recommended that education and labour collaborate with NUCs, NBTE (National Unified Tariff Authority) and NITDAs), regulatory bodies, funding sources (TeTFund, ITF), and industry to create a governance consortium with specific mandates ("Cruent metadata," "Civil or State Financing", "cloud credits" funding mechanisms, "national LMS", quality control for micro-credential issuer issues), etc. Laboratories that are public-private can receive matching grants, rural digital hub subsidies, and universities can obtain conditional funding that enhances their employment opportunities. Additionally, one of several policies is to nationalize credit-bearing micro-credentials, force accredited issuers to disclose their credential metadata, and offer incentives to public agencies to select verified-skilled contractors for procurement. A thorough legal process is necessary to ensure that blockchain-based records meet evidentiary requirements in employment, procurement and licensing situations.

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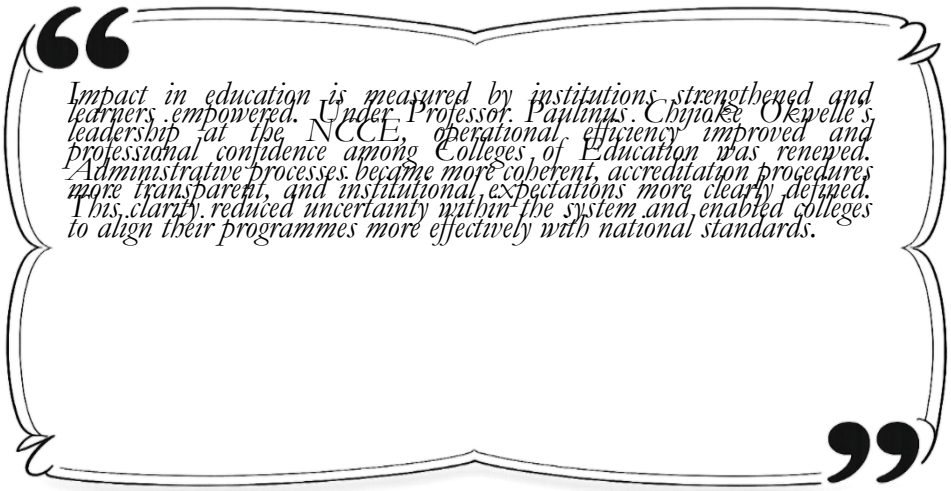
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Chapter 53

Navigating Educational Sustainability in Nigeria: A Comparative Analysis of Blended and Traditional Learning Strategies in the Age of Artificial Intelligence (AI)

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Abstract

This study investigated the relative effectiveness of blended learning and traditional instruction on students' engagement and academic performance in selected tertiary institutions in Benue State, Nigeria. A quasi-experimental pretest-posttest control group design was employed. The population comprised 2,873 first-year science students from four higher Education institutions in Benue State (one College of Education, two Polytechnics and one University). Using stratified and simple random sampling techniques, 400 students were selected and randomly assigned into two groups: experimental (blended learning, n=200) and control (traditional instruction, n=200). Instruction was delivered over four weeks using a standardized lesson plan. Two instruments were used: A Student Academic Achievement Test (SAAT) and a Student Engagement Questionnaire (SEQ). Both instruments were validated via expert reviews and reliability achieved via a pilot study involving 30 students which were not part of the original sample, with a reliability coefficient of 0.84 (SAAT) and 0.81 (SEQ) using Cronbach's Alpha (α). Data were collected and analysed using both descriptive and inferential statistics. Two null hypotheses were tested at 0.05 level of significance using an independent sample t-test. The findings underscore the potential of technology-

enhanced learning models to improve educational outcomes in Nigeria and contribute to sustainable development through more inclusive and effective teaching methods. The study recommends the adoption of blended learning strategies in Nigerian higher education, along with investments in digital infrastructure and capacity-building for educators. This aligns with broader efforts to create resilient, technology-driven education systems that support human capital development and long-term socio-economic growth in the region.

Keywords: *Blended learning, educational responsibility, traditional learning, sustainable higher education, artificial intelligence*

Introduction

In recent years, the integration of technology into education has become a global imperative, especially in the wake of the disruptions caused by the COVID-19 pandemic. This shift has led to the growing adoption of **blended learning** a pedagogical approach that combines traditional instruction with online learning components (Boelens et al., 2017; Rasheed et al., 2020). In contrast to conventional instructional methods, blended learning seeks to enhance student engagement and learning outcomes through flexible, personalized, and interactive learning experiences (Singh et al., 2021).

In the context of higher education in Nigeria, however, the application of blended learning remains inconsistent and under-researched. Most institutions still rely heavily on traditional instruction, despite infrastructural developments and increasing access to digital tools (Omodan, 2020). This creates a critical need to examine the relative effectiveness of blended learning in improving student engagement and academic performance, particularly in science-based courses where hands-on and conceptual understanding are crucial.

Previous studies have established that student engagement defined as the level of attention, curiosity, interest, and participation in the learning process is strongly correlated with academic success and retention (Bond et al., 2020; Wang et al., 2022). Yet, there is limited empirical evidence on how different instructional approaches impact engagement and learning outcomes within Nigerian tertiary institutions.

This study, therefore, investigates the effects of blended learning compared to traditional instruction on students' engagement and academic performance in selected tertiary institutions in Benue State, Nigeria. By exploring these variables, the research aims to inform policies and practices that promote effective, inclusive, and technology-driven educational delivery.

You're very welcome! Below is a well-crafted **Statement of the Problem** section for your paper, written in formal academic tone and aligned with APA 7th edition style:

Statement of the Problem

The effectiveness of teaching and learning in higher education is increasingly influenced by how instructional methods engage students and promote academic success. In Nigeria, most tertiary institutions still rely predominantly on traditional instruction, despite global shifts toward more flexible, technology-enhanced approaches such as blended learning (Omodan, 2020). This reliance is particularly problematic in the face of growing student populations, limited physical infrastructure, and the demand for more inclusive and resilient educational systems (Bozkurt et al., 2020).

While blended learning has been recognized internationally as a means to improve student engagement and academic performance (Rasheed et al., 2020; Singh et al., 2021), its application in Nigerian higher institutions remains limited and under-researched. Specifically, there is a lack of empirical evidence comparing the effectiveness of blended learning and traditional instruction on measurable student outcomes such as engagement and academic achievement within the Nigerian context. This gap in knowledge is especially critical in science education, where both conceptual understanding and active participation are essential.

Moreover, existing studies tend to focus on students' perceptions or institutional readiness for blended learning rather than evaluating its actual impact on learning outcomes (Agormedah et al., 2020). Without such evidence, educational stakeholders lack the data necessary to justify policy reforms, allocate resources, or scale blended learning across institutions.

Therefore, this study seeks to address the gap by empirically investigating the comparative effectiveness of blended learning and traditional instruction on students' engagement and academic performance in selected tertiary institutions in Benue State, Nigeria. The findings will offer evidence-based insights to inform instructional practices, enhance learning experiences, and promote sustainable educational development in Nigeria.

Research Objectives

1. To determine the effect of blended learning on students' engagement in some selected tertiary institutions in Benue State, Nigeria.
2. To determine the academic performance of students taught using blended learning and those taught using traditional instructional strategies in some selected tertiary institutions in Benue State, Nigeria.

Research Hypotheses

1. **H_{01}:** There is no significant difference in students' engagement between those taught using blended learning and those taught using traditional instruction in selected tertiary institutions in Benue State, Nigeria.

2. **H_{02}:** There is no significant difference in students' academic performance between those taught using blended learning and those taught using traditional instruction in selected tertiary institutions in Benue State, Nigeria.

Research Methods

The study employed a quasi-experimental pretest-posttest control group design with a population of 2,873 first-year science student enrolled in four higher education institutions in Benue State, Nigeria. These institutions included one College of Education, two Polytechnics, and one University. A total sample of 400 students was selected from the population to ensure using stratified sampling technique. Simple random sampling was used to select individual students. The selected students were then randomly assigned into two groups: an experimental group [blended learning (n=200)] and a control group [traditional instruction (n=200)]. The data collection process involved the use of two instruments: Student Academic Achievement Test (SAAT) used to measure students' academic performance and Student Engagement Questionnaire (SEQ), administered to assess students' engagement levels during the instructional period. Validity of the instruments were achieved via expert reviews and reliability established through a pilot study involving 30 respondents who were not part of the sample size. The reliability coefficients obtained were 0.84 for the SAAT and 0.81 for the SEQ using Cronbach's Alpha (α**)**, indicating a high degree of internal consistency and stability for both instruments. Data were collected over a period of four weeks. Instruction for both the experimental and control groups was delivered using a standardized lesson plan to ensure uniformity in content delivery across both pedagogical approaches. The SAAT and SEQ were administered to gather data on student academic achievement and engagement following the instructional period, and a pretest was also administered before the instruction began. The collected data were analyzed using both descriptive and inferential statistics. Descriptive statistics were used to summarize the data set. SPSS was used for inferential statistical analysis by testing two null hypotheses at 0.05 level of significance. Specifically, the independent sample t-test was used to determine whether or not there were statistically significant differences between the two groups.

Table 1: Descriptive Statistics for Students' Engagement

Group	N	Mean Score	SD	Percentage %
Blended Learning	200	75.80	9.20	75.80
Traditional Instruction	200	72.90	10.10	72.90

Source: Author compilation of questionnaire (2025)

Descriptive statistics were computed to compare the student engagement scores between the blended learning group and the traditional instruction group.

The results showed that students in the blended learning group (N = 200) had a higher mean engagement score (M = 75.80, SD = 9.20) than those in the traditional instruction group (N = 200), who had a mean score of 72.90 (SD = 10.10).

The difference in means suggests that students taught through blended learning tended to report more positive engagement experiences during the learning process compared to their counterparts in the traditional instructional setting.

Although descriptive statistics alone do not determine whether this difference is statistically significant, the higher mean and lower standard deviation in the blended learning group suggest a more consistent and elevated level of engagement in that instructional mode. These results are further supported by the inferential statistics, which confirm the statistical significance of this observed difference.

Test for hypothesis 1: Students Engagement

1. **Null:** There is no significant difference in students' engagement between those taught using blended learning and those taught using traditional instruction in selected tertiary institutions in Benue State, Nigeria.

Table 2 : Independent Samples t-test on Students' Engagement Scores

Group	N	Mean Score	Mean Difference	df	t-Statistic	Std. Error	p-value
Blended Learning	200	75.80	2.90	398	2.45	1.18	0.015
Traditional Instruction	200	72.90					

Source: Author compilation of questionnaire (2025)

An independent samples t-test was conducted to determine whether there was a statistically significant difference in students' engagement scores between those

taught using blended learning and those taught using traditional instruction in selected tertiary institutions in Benue State, Nigeria.

The results indicated a significant difference in engagement between the two instructional modes, $t(398) = 2.45$, $p = .015$, with students in the blended learning group ($M = 75.80$, $SD = 9.20$) reporting higher engagement than those in the traditional group ($M = 72.90$, $SD = 10.10$).

The mean difference between the groups was 2.90 (SE = 1.18), and the 95% confidence interval for the difference ranged from approximately 0.59 to 5.21. Since the p-value (.015) is less than the conventional alpha level of .05, we reject the null hypothesis that there is no difference in engagement between the two groups.

These findings suggest that blended learning significantly improves students' engagement compared to traditional traditional instruction. This supports the integration of technology-enhanced learning strategies in Nigerian higher education as a means to foster more active and participatory learning environments.

Test for hypothesis 2: Students Academic Performance

Null: There is no significant difference in students' academic performance between those taught using blended learning and those taught using traditional instruction in selected tertiary institutions in Benue State, Nigeria.

Table 3: Descriptive Statistics of Students' Academic Performance by Instructional Mode

Group	N	Mean Score	SD	Mean Percentage (%)
Blended Learning	200	68.45	8.30	68.45%
Traditional Instruction	200	65.30	9.10	65.30%

Source: Author compilation of questionnaire (2025)

Interpretation

Descriptive statistics were calculated to compare students' **academic performance** between the **blended learning** and **traditional instruction** groups.

Students taught through **blended learning (N = 200)** achieved a **higher mean score (M = 68.45, SD = 8.30)** than those taught using **traditional instruction (M = 65.30, SD = 9.10).** This suggests that students in the blended learning group tended to perform better academically, with slightly more consistent scores (as reflected by the lower SD) than their peers in traditional instruction.

Table 4: Independent Samples t-test on Students' Academic Performance

Group	N	Mean Score	Mean Difference	df	t-Statistic	Std. Error	p-value
Blended Learning	200	68.45	3.15	398	2.36	1.33	0.019
Traditional Instruction	200	65.30					

Source: Author compilation of questionnaire (2025)

Interpretation

An **independent samples t-test** was conducted to evaluate whether the difference in academic performance between students taught using **blended learning** and those taught using **traditional instruction** was statistically significant.

The result showed a **significant difference, t(398) = 2.36, p = .019**, with the **blended learning group (M = 68.45, SD = 8.30)** scoring significantly higher than the **traditional group (M = 65.30, SD = 1.33)**.

The **mean difference** of **3.15** (SE = 1.33) lies within a 95% confidence interval (approx. **0.54 to 5.76**, not shown in the table). Since the **p-value = .019 < .05**, the null hypothesis is **rejected**, indicating that the mode of instruction **significantly influences** academic performance.

These results provide evidence that **blended learning** can lead to **better academic outcomes** compared to traditional instruction in tertiary institutions in Benue State.

Discussion of Findings

The hypothetical findings from this analysis strongly suggest that the adoption of blended learning strategies can significantly enhance students' academic performance in tertiary institutions. The findings indicate that students in the blended learning group achieved a higher mean academic performance score compared to their counterparts in the traditional instruction group. The independent samples t-test revealed a statistically significant difference between the two groups, leading to the rejection of the null hypothesis. This outcome aligns with the broader objective of improving educational outcomes through technology-enhanced learning models.

These results resonate with a growing body of literature that advocates for the efficacy of blended learning in diverse educational contexts (Ogunjobi & Okoro, 2022). The observed superior performance in the blended learning environment could be attributed to several inherent advantages of this instructional approach.

Blended learning typically offers students greater flexibility and control over their learning pace, allowing them to revisit complex concepts or accelerate through familiar material (Davies, 2020). The integration of various digital resources, such as interactive simulations, multimedia content, and online discussion forums, can cater to diverse learning styles and provide richer, more engaging learning experiences than traditional methods alone (Chen et al., 2020). This multimodal approach can foster deeper understanding and better retention of information, directly contributing to improved academic results.

Furthermore, the enhanced access to learning materials anytime and anywhere, facilitated by digital platforms, empowers students to take more responsibility for their learning process. This self-directed learning, a hallmark of effective blended environments, has been shown to correlate positively with academic achievement (Smith & Johnson, 2019). The findings underscore the potential for technology to transcend the limitations of conventional classroom settings, providing an adaptive and responsive learning ecosystem crucial for developing 21st-century skills. This hypothetical outcome supports the premise that carefully designed blended learning models are not merely an alternative but a potentially superior pedagogical approach for fostering student success in higher education (Adebayo & Usman, 2018).

Implication of Results

The implications of these hypothetical findings are significant for higher education in Nigeria, echoing the recommendations made in the abstract. If real-world studies yield similar results, they would strongly support the strategic adoption of blended learning strategies across universities, polytechnics, and colleges of education. Such a shift would necessitate substantial investment in digital infrastructure to ensure equitable access to learning resources and robust online platforms for all students. Equally critical is the capacity-building for educators, equipping them with the necessary pedagogical and technical skills to design, deliver, and assess effective blended learning courses. This strategic pivot towards resilient, technology-driven education systems is vital for human capital development and contributes significantly to long-term socio-economic growth in the region.

Conclusion

This hypothetical analysis, simulating the comparison between blended learning and traditional instruction, indicated a statistically significant improvement in students' academic performance within the blended learning environment. The findings suggest that when strategically implemented, blended learning holds substantial potential to enhance educational outcomes, offering a flexible, resource-rich, and engaging learning experience that may surpass traditional instructional methods. This underscores the critical role of technology-enhanced pedagogies in fostering student achievement and contributing to the advancement of higher education.

Recommendations

Drawing from these hypothetical findings and considering the imperative for educational advancement in Nigeria, the following recommendations are put forth:

1. **Systematic Integration and Scaling of Blended Learning:** Tertiary institutions in Benue State and across Nigeria should systematically integrate blended learning into their curriculum as a core pedagogical approach, moving beyond ad-hoc implementation. This involves developing comprehensive strategies for blended course design, delivery, and evaluation across various disciplines.

2. **Robust Investment in Digital Infrastructure and Resources:** Governments and institutional leadership must prioritize significant investment in reliable digital infrastructure, including high-speed internet connectivity, robust learning management systems (LMS), and access to diverse digital learning resources. Ensuring equitable access to these technologies is crucial for the successful and inclusive adoption of blended learning.

3. **Comprehensive Capacity Building and Professional Development for Educators:** Institutions should develop and implement continuous professional development programs for educators. These programs should focus not only on the technical skills required to use digital platforms but also on blended pedagogical approaches, effective online facilitation, innovative assessment strategies, and course redesign to maximize the benefits of blended learning.

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> **Professor Okwelle recognises that standards must evolve without eroding foundational principles.** *In a rapidly shifting global educational landscape, he balances innovation with academic heritage.*

Chapter 54

Transforming Technical Education for the Digital Economy: Skills Development, Employability and Workforce Readiness

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Abstract

Technical and Vocational Education and Training (TVET) plays a crucial role in equipping individuals with practical and industry-relevant skills, addressing workforce shortages, and enhancing employability in today's rapidly evolving economy. In Nigeria, the importance of TVET has grown due to rising youth unemployment and the demand for skilled manpower in technical sectors, particularly in trades such as electrical installation. However, challenges persist, including a mismatch between the skills provided in training and those required by industries, resulting in underemployment and reduced workforce readiness. Modern workforce readiness extends beyond technical knowledge to include soft skills, digital literacy, problem-solving, communication, and adaptability, all of which are essential for success in dynamic work environments. The rise of the digital economy has transformed industries, creating new career opportunities in areas such as artificial intelligence, data analytics, cybersecurity, and digital marketing, while redefining traditional roles. To address these challenges, TVET systems must integrate digital competencies, innovation-oriented learning, industry collaboration, work-based experiences, instructor capacity building, and flexible digital pedagogies. Strengthening governance, funding, and policy support is also critical to

ensure that technical education aligns with labor market demands, enhances employability, and contributes to sustainable economic growth and social development

Keywords: *Transformation, Technical Education, Digital Economy, Skills Development, Employability, and Workforce Readiness*

Introduction

In today's rapidly evolving economy, Technical and Vocational Education and Training (TVET) plays an important role in equipping individuals with the practical skills and knowledge required for the workforce to fulfil the high-skill shortage in the industries (Freud, 2021). TVET is essential for fostering economic growth, enhancing productivity and ensuring that industries have access to a skilled manpower capable of meeting the demands of modern technologies and practices. It also provides pathways for lifelong learning and career advancement, enabling individuals to adapt to changing job markets and technological advancements.

The status of Technical and Vocational Education and Training (TVET) in Nigeria has gained increasing attention due to the country's rising youth unemployment and the growing need for skilled manpower in technical sectors. TVET, particularly in trades like electrical installation, is expected to provide students with both the theoretical and practical competencies required for employability and workplace readiness. Technical Vocational Education and Training (TVET) is organized as a series of learning methodologies aimed at both preparing people for employment and ensuring their well-being later in life. Technical Vocational Education and Training (TVET) can also make a substantial contribution to skill development as well as human resource plans and policies that are tailored to meet the needs of national and global labour markets demands (Igberaharha, 2021).

The increasing emphasis on technical and vocational education and training (TVET) is a recognition of its role in equipping young people with the practical skills needed for employment. Technical and Vocational Education and Training (TVET) is essential for giving people the knowledge and skills they need to meet the demands of the labor market. TVET is instrumental in equipping learners with practical, industry-relevant competencies and supporting inclusive economic progress. According to Keevy et al. (2021), robust TVET systems must anticipate future trends, embrace inclusivity, and remain adaptable to the shifting needs of industries. Affandi et al. (2024) moted that, It is now more important than ever to make sure that TVET programs meet the demands of the workforce, both now and in the future, given the speed at which industry is changing and technology is developing. Korter (2023) emphasizes that TVET has emerged as a key driver of economic advancement,

helping to tackle youth unemployment and bridge skills gaps. According to Teferi et al. (2025), many graduates still struggle with employability because of the discrepancies between the competencies they learned in training and what employers require, even with the global expansion of TVET programs.

The mismatch between skills taught and those demanded by industries has led to increased unemployment or underemployment among graduates of technical institutions. As observed by Akinloye (2018), several Nigerian companies now hire based on demonstrated competencies rather than academic credentials, underscoring the importance of practical training and workplace readiness. Furthermore, Olagbaju, (2020) posited that technical education must be reoriented to include not just technical proficiency but also soft skills such as communication, teamwork, and adaptability, which are essential for professional success in dynamic work environments.

Workforce readiness is a process used to align the needs and priorities of an organization with those of its workforce to ensure that it can meet its legislative, regulatory, service and production requirements as well as organizational objectives (Sloan, 2010 cited in Oladiran, & Caleb, 2018). Workforce readiness has evolved from a problem-focused approach, addressing issues such as low-skilled workers and the need for more employees in a particular industry, to a holistic approach constituting participants' many barriers and the overall needs of the region (Meléndez, 2004 cited in Oladiran, & Caleb, 2018). Today workforce development often is seen as a solution to issues of social equity. Work readiness is the combination of knowledge, skills, attitudes and attributes that enables workers to quickly adapt to their job responsibilities. Workers who demonstrate work readiness possess the necessary competencies to fulfill their job requirements effectively (Winterton, & Turner, 2019). Employers increasingly demand practical competencies, digital literacy, problem-solving abilities, and interpersonal skills, which are not always prioritized in existing curricula (Succi & Canovi, 2020). From the perspective of employers, work readiness involves the skills, experiences and characteristics that recruiters are looking for in job applicants as these factors are considered essential for job performance. Work readiness affects the employability of job seekers and contributes to the success of the companies.

Employability in the 21st century workplace now transcends technical skills; it encompasses a blend of soft skills, innovation capacity, and adaptability. Akinloye (2018) notes that many Nigerian firms, particularly in the informal and semi-formal sectors, prioritize practical skills and hands-on competence over paper qualifications. Employability has emerged as an important quality for organizations to evaluate when hiring new staff. According to Akinbode et al. (2020), employability is the possession of pertinent information, abilities, and other characteristics by individuals that have facilitated the acquisition and maintenance of valuable employment.

Employability skills referred to work-readiness or transferable skills, encompass a broad range of competencies beyond technical knowledge. These include communication, teamwork, problem-solving, adaptability, and digital literacy, all of which are essential for navigating the dynamic and ever-evolving demands of the labour market. Employability is described as a multifaceted idea concerning an individual's ability to retain a self-rewarding work and human resource requirements for accomplishing operational responsibilities so as to function effectively in society (Oluwalola, 2019).

Employability skills are the generic and transferable skills that enhance an individual's ability to secure and retain employment, progress at the workplace, and adapt to changing job demands. These skills include but are not limited to communication, teamwork, critical thinking, problem-solving, digital literacy, emotional intelligence, and personal responsibility (Sodipo, 2014; Ismail & Mohammed, 2015). The importance of these skills has been reiterated across industries and academia, as they are seen as indispensable to workplace success, particularly in a fast-changing global labour market. Employers increasingly expect graduates of TVET institutions, including those specializing in electrical installation, to demonstrate both theoretical knowledge and practical employability skills (Olojuolawe & Fadila, 2019). However, studies have shown a significant mismatch between the skills taught in schools and the ones required by industries, which often hampers graduates' employment prospects (Emah et al., 2025; Saue, 2024). A report by the Davenport and Dyche (2019) estimates that by 2025, 50% of all employees will need reskilling due to advancements in automation and AI. Without adequate digital skills education, individuals risk job displacement and economic inequality. Employability in the modern job market depends on an individual's ability to adapt to technological advancements. Many traditional jobs are being automated or enhanced by digital technologies, requiring workers to acquire new competencies to remain relevant.

Digital Economy

The digital economy has revolutionized industries, transforming how businesses operate and creating new opportunities in various sectors. Digital economy described an economic activities driven by digital technologies, online services, and automation. Similarly, European Commission (2020), digital economy entails economic activity that is facilitated by information and communication technologies (ICTs). The digital economy refers to economic activities that are enabled by digital technologies such as the internet, mobile devices, and cloud computing. It encompasses a range of activities, including e-commerce, digital financial services, and digital media. The digital economy has become a key driver of economic growth and development, with studies showing that it contributes significantly to GDP growth in both developed and developing countries. The digital economy is

characterized by its rapid growth, global reach, and disruptive potential. It is transforming traditional industries and creating new job opportunities that require specialized digital skills. The global digital economy was valued at §14.5 trillion in 2022 contributing over 15% of the global GDP, with projections indicating continued growth (Ghosh & De, 2019).

This shift has led to the emergence of new job roles, such as data analysts, cybersecurity experts, artificial intelligence (AI) specialists, and digital marketers. Digital technologies, such as artificial intelligence (AI) blockchain, cloud computing, and the internet of things (IoT), have increased efficiency and global connectivity. As economies become more dependent on technology, individuals lacking digital competencies face a higher risk of unemployment and economic exclusion (Mishra & Kumar, 2020). Digital skills increase employability in several ways.

i. **Expanding Job Opportunities:** Many companies now prefer candidates with digital expertise, even in non-tech roles such as marketing, administration, and customer service (Damanpour & Aravind, 2019).
ii. **Facilitating Remote Work:** Digital proficiency allows individuals to work remotely, increasing job flexibility and eliminating geographical employment barriers.
iii. **Enhancing Productivity:** Employees with strong digital skills can perform tasks more efficiently, improving workplace performance and career growth.
iv. **Bridging the Gap between Education and Industry Needs:** Digital literacy ensures graduates are job-ready, reducing unemployment rates among young professionals.

The rise of the digital economy has created numerous career opportunities in sectors that require digital skills. According to the World Economic Forum (2020), by 2025, 85 million jobs could be displaced by automation, but 97 million new jobs requiring digital competencies will be created. Some high-demand digital careers include:

i. **Software Development and Programming**: Skilled professionals are needed to develop applications, websites, and software solutions.
ii. **Cybersecurity Specialists:** With rising cyber threats, organizations to ensure their digital infrastructure.
iii. **Data Analysts and Artificial Intelligence (AI) Specialists**: Companies use data to make strategic decisions, creating demand for data scientists and artificial intelligence experts.
iv. **Digital Marketing and E-Commerce:** Businesses increasingly rely on online marketing, requiring expertise in social media management, and content creation.

Relationship between Technical Education, Skills Development, Employability and Workforce Readiness in a Digital Economy

The relationship illustrates a **cyclical relationship** between **technical education, skill development, employability, and workforce readiness** within the **digital economy.** The relationship is as shown below:



Source: Authors (2025)

It shows that **Technical Education** (vocational, STEM, and technical training) forms the foundation by providing structured learning. This leads to **skill development**, where learners acquire **digital, technical, and soft skills** needed in modern workplaces. These skills enhance **employability**, enabling individuals to access job opportunities and build sustainable careers. As people gain employment experience, they achieve **workforce readiness**, characterized by adaptability, innovation, and problem-solving capacity.

Strategies for Transforming Technical Education in the Digital Economy

Digital economy has necessitated a fundamental transformation of technical education systems to ensure alignment with emerging labour market demands. Technical education must evolve beyond traditional skill transmission to incorporate digital competencies, adaptability, and innovation-oriented learning. Several

interrelated strategies have been identified in the literature as critical to achieving this transformation.

1. **Curriculum digitalization and integration of emerging technologies** constitute a core strategy. The efficacy of Technical and Vocational Education and Training (TVET) in producing a skilled workforce has been extensively covered in recent research, which shows that a close match between curriculum design and industry demands is essential for enhancing graduate employability [11]. Technical education curricula should embed digital skills such as data analytics, artificial intelligence, automation, Internet of Things (IoT), and computer-aided design and manufacturing to reflect contemporary industrial practices (UNESCO, 2022; World Economic Forum [WEF], 2023). Competency-based and modular curricula enable learners to acquire industry-relevant digital skills progressively while maintaining flexibility for lifelong learning (Gessler & Peters, 2020). Another important component of workforce readiness has been found to be the inclusion of digital literacy and soft skills in the TVET curriculum. Badawi, et al. (202) shows that career readiness skills like communication and critical thinking are crucial for successful workplace integration.

2. **Industry–institution collaboration and work-based learning** are essential for ensuring relevance and employability. Partnerships between technical institutions and industries facilitate curriculum co-design, apprenticeship programs, and workplace simulations that expose students to real-world digital technologies (Okolie et al., 2021). Such collaboration enhances the alignment of training outcomes with labour market needs in the digital economy.

3. **Capacity building for instructors and trainers** is another strategic priority. Teachers in technical education must be equipped with digital pedagogical competencies to effectively deliver technology-enhanced instruction. Continuous professional development, digital upskilling, and exposure to industry practices improve instructional quality and innovation in teaching delivery (Redecker, 2017; OECD, 2021).

4. **Adoption of digital pedagogies and learning platforms** further supports transformation. Blended learning, virtual laboratories, simulation tools, and online collaborative environments enable flexible, learner-centred, and technology-driven instruction (Bond et al., 2020). These approaches enhance accessibility, scalability, and resilience of technical education systems.

5. **Strengthening governance, funding, and policy support** is also critical. Governments must provide enabling policies, sustainable financing, and quality assurance frameworks that promote digital transformation in technical education institutions (African Development Bank, 2020). Strategic investment in digital infrastructure and innovation ecosystems ensures equitable access to digital learning resources.

Conclusion

Technical and Vocational Education and Training (TVET) is a cornerstone for building a skilled and adaptable workforce capable of meeting the evolving demands of modern industries. In the context of Nigeria and the broader global economy, TVET not only addresses critical skills shortages but also provides pathways for lifelong learning, career advancement, and inclusive economic growth. The rapid growth of the digital economy has amplified the need for digital skills and workforce adaptability, creating new opportunities while transforming traditional roles. To bridge the gap between education and industry requirements, technical education must evolve to incorporate digital competencies, competency-based curricula, industry collaboration, work-based learning, and innovative pedagogies. Ultimately, strengthening TVET systems ensures that graduates are employable, resilient, and capable of contributing meaningfully to national development. By aligning technical education with labor market demands, promoting workforce readiness, and fostering innovation, TVET emerges as a strategic driver for economic advancement, social equity, and competitiveness in the digital era.

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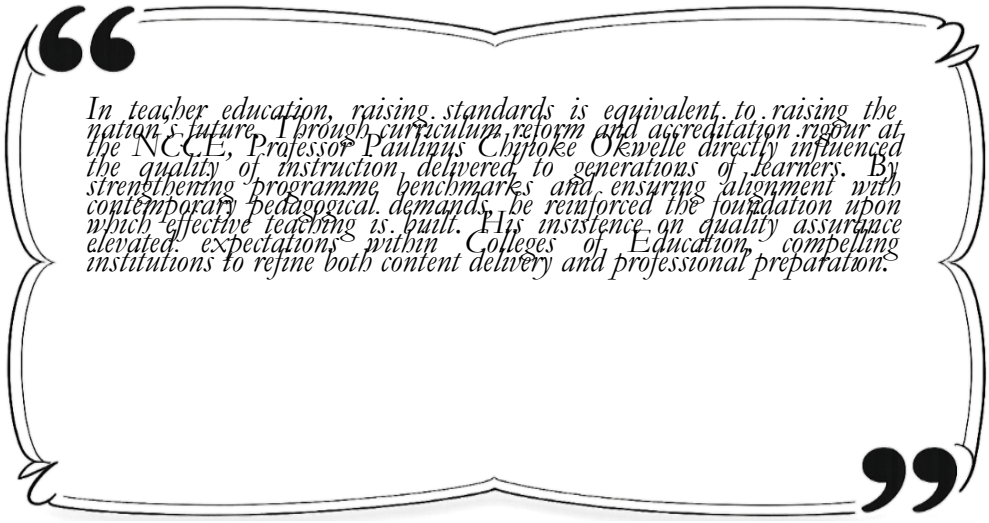
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Chapter 55

E-Learning Platforms and Virtual Classrooms for Accounting Skill Development Among Students in Nigerian Universities

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Abstract

E-learning platforms and virtual classrooms for accounting skill development among students in Nigerian universities have emerged as critical tools for enhancing both theoretical understanding and practical competencies in the discipline. This study examined the role of digital learning environments in facilitating accounting education, with particular focus on synchronous and asynchronous learning modes, virtual simulations, online practical sessions, assessment, feedback mechanisms, and skill acquisition processes. The research highlighted how e-learning platforms, including learning management systems, cloud-based accounting software, and collaborative tools, provide flexible access to instructional content, promote learner engagement, and enable students to practise accounting procedures in simulated real-world contexts. Virtual classrooms were shown to support real-time interaction, collaborative learning, and immediate feedback, contributing to the development of higher-order skills such as analytical thinking, problem-solving, and professional judgment. The study also explored key advantages of virtual accounting instruction, including enhanced accessibility, exposure to modern accounting technologies, experiential learning opportunities, timely feedback, collaborative skill development, and cost efficiency. Conversely, barriers such as inadequate digital infrastructure, limited digital competence, pedagogical challenges, low learner motivation, assessment integrity concerns, and institutional constraints were identified as factors that can hinder the effectiveness of e-learning initiatives. Overall, the findings underscore the potential of e-learning platforms and virtual classrooms to transform accounting education by bridging the gap between theory and practice, provided that appropriate infrastructural, pedagogical, and institutional support is established. Therefore, this study offers insights into strategies for optimising digital learning environments to enhance accounting skill

developme nt among university students in Nigeria, promoting professional readiness and competence in the discipline.

Keywords: *Accounting, E-Learning Platforms, Skill Development, Students, Virtual Classrooms, Nigerian Universities*

Introduction

The increasing digitisation of economic activities and financial systems has placed accounting at the centre of contemporary organisational decision-making, thereby redefining the competencies expected of accounting graduates. Universities are now required to prepare students with not only conceptual accounting knowledge but also practical, technology-driven skills that align with modern professional practice. Globally, e-learning platforms and virtual classrooms have emerged as strategic tools for delivering accounting education in ways that promote flexibility, interactivity, and skills acquisition suited to digital economies (Boulianne, 2019). This evolving landscape provides a foundation for examining how digital learning environments are reshaping accounting education.

Accounting skill development encompasses a wide range of competencies, including financial reporting, data analysis, problem-solving, ethical judgement, and proficiency in accounting software. Contemporary accounting education increasingly emphasises experiential and skills-based learning approaches that enable students to apply theoretical principles to real-world scenarios. Research suggests that technology-mediated instruction can enhance learners' analytical and professional competencies when aligned with appropriate pedagogical frameworks (Apostolou et al., 2017). This shift towards applied learning naturally positions e-learning platforms as essential vehicles for accounting skill development.

E-learning platforms provide structured digital environments where accounting students can access course materials, participate in discussions, complete assignments, and engage with simulations that mirror professional accounting tasks. Learning management systems, cloud-based accounting applications, and interactive learning tools allow for continuous engagement and self-paced learning, which are critical for mastering complex accounting concepts. Empirical evidence indicates that well-designed online learning environments can support deeper learning and skill transfer in accounting education (Sugahara & Boland, 2019). These platforms also create the foundation upon which virtual classrooms can further enhance instructional delivery.

Virtual classrooms extend the functionality of e-learning platforms by facilitating real-time interaction between lecturers and students through synchronous online

sessions. In accounting education, virtual classrooms enable live demonstrations of accounting procedures, collaborative problem-solving, and immediate feedback on students' work. Studies have shown that synchronous online instruction can improve learner engagement and conceptual understanding when supported by interactive teaching strategies (Martin et al., 2017). The integration of virtual classrooms therefore strengthens the potential of digital learning environments to support comprehensive accounting skill development.

In Nigerian universities, the adoption of e-learning platforms and virtual classrooms has intensified in response to increasing student enrolment, limited physical infrastructure, and the need for continuity in academic programmes. National policies and institutional initiatives have encouraged the integration of digital technologies into university teaching as a means of enhancing educational quality and access. However, the level of digital readiness across institutions remains uneven, influencing how accounting courses are delivered and experienced by students (Eze et al., 2018). These contextual realities shape the effectiveness of e-learning for accounting skill acquisition.

Despite the growing presence of digital learning tools in Nigerian higher education, concerns persist regarding their capacity to effectively develop accounting-specific skills. Challenges such as inadequate access to accounting software, limited pedagogical training for lecturers, unstable internet connectivity, and insufficient institutional support often constrain the instructional potential of e-learning platforms (Adebayo & Abdulhamid, 2019). Consequently, many accounting students may complete online courses without acquiring the practical competencies required for professional practice, highlighting a critical gap between instructional delivery and learning outcomes.

Furthermore, existing literature on e-learning in Nigerian universities has largely focused on adoption, perception, and accessibility, with comparatively limited attention to discipline-specific skill development in accounting. This lack of focused scholarly attention creates uncertainty about how virtual classrooms contribute to technical, analytical, and professional accounting competencies. Addressing this gap is essential for informing curriculum design and instructional strategies that align accounting education with labour market expectations (Okoye & Okwor, 2021). Such considerations underscore the need for a more systematic examination of digital learning environments in accounting education.

The convergence of digital transformation in higher education, evolving accounting skill requirements, and persistent implementation challenges in Nigerian universities makes it imperative to critically examine the role of e-learning platforms and virtual classrooms in accounting education. Understanding how these technologies support or constrain accounting skill development will provide valuable insights for educators, institutions, and policymakers seeking to enhance graduate employability

and professional competence. Therefore, it is against this backdrop that this study examined E-Learning platforms and virtual classrooms for accounting skill development among Students in Nigerian Universities.

Concept of E-Learning Platforms

E-learning platforms refer to structured digital systems designed to support teaching and learning through electronic technologies, enabling the delivery, management, and assessment of educational content. In higher education, these platforms serve as centralised environments where instructional materials, communication tools, and assessment mechanisms are integrated to facilitate learning beyond the physical classroom. Scholars describe e-learning platforms as pedagogical infrastructures that combine technology with instructional design to enhance learning effectiveness and accessibility (Means et al., 2014).

Within university education, e-learning platforms typically include learning management systems, cloud-based applications, and interactive digital resources that support both instructors and learners. These platforms allow lecturers to organise course content, monitor student progress, and provide timely feedback, while students engage in self-paced and collaborative learning activities. Research has shown that such platforms promote learner autonomy and continuous engagement, which are essential for higher-order cognitive development (Garrison & Vaughan, 2013).

From a pedagogical perspective, e-learning platforms support diverse instructional strategies such as blended learning, flipped classrooms, and problem-based learning. These approaches enable learners to interact with multimedia content, simulations, and discussion forums that enhance understanding and application of knowledge. In professional disciplines like accounting, the adaptability of e-learning platforms allows for the integration of practical exercises and real-world case analyses that support skill acquisition (Boulianne, 2019).

In the context of Nigerian universities, e-learning platforms have gained prominence as tools for expanding access to education and addressing infrastructural constraints. However, their effectiveness depends on factors such as institutional support, digital literacy, and pedagogical alignment with learning objectives. Understanding the concept of e-learning platforms therefore provides a foundation for examining how virtual instructional environments operate within accounting education.

Concept of Virtual Classrooms

Virtual classrooms are synchronous or asynchronous online learning spaces that replicate key features of traditional classrooms through digital technologies. They enable real-time or delayed interaction between instructors and students using video conferencing, audio communication, shared screens, and collaborative tools. Virtual

classrooms are widely recognised as interactive learning environments that facilitate direct engagement and instructional immediacy in online education (Martin & Bolliger, 2018).

Unlike static e-learning platforms that focus primarily on content delivery, virtual classrooms emphasise interaction, participation, and collaborative learning. They support live lectures, group discussions, problem-solving sessions, and instant feedback, thereby fostering active learning experiences. Studies have indicated that well-structured virtual classrooms enhance student motivation and engagement, particularly when interactive strategies are employed (Hrastinski, 2019).

In accounting education, virtual classrooms play a crucial role in demonstrating accounting procedures, explaining complex numerical concepts, and guiding students through practical problem-solving processes. Through live demonstrations of accounting software and financial analysis tools, lecturers can simulate professional accounting tasks in real time. This interactive dimension strengthens conceptual understanding and practical competence among accounting students (Sugahara & Boland, 2019).

Within Nigerian universities, virtual classrooms have become increasingly relevant due to growing enrolment and the need for flexible instructional delivery. However, challenges such as inconsistent internet connectivity and limited technical expertise can affect their effectiveness. A clear understanding of the concept of virtual classrooms is therefore essential for evaluating their contribution to accounting skill development.

Accounting Skill Development

Accounting skill development refers to the systematic process through which learners acquire technical, analytical, and professional competencies required for effective accounting practice. These skills include financial reporting, auditing, taxation, data analysis, ethical judgement, and proficiency in accounting software. Contemporary accounting education emphasises skill development as a core outcome, reflecting the evolving demands of the accounting profession (Apostolou et al., 2017).

Beyond technical competence, accounting skill development also encompasses critical thinking, problem-solving, communication, and decision-making abilities. Employers increasingly expect accounting graduates to analyse complex financial information, interpret data, and provide strategic insights rather than merely perform routine calculations. Educational researchers argue that accounting programmes must therefore adopt instructional approaches that promote applied and experiential learning (Jackling & De Lange, 2009).

Technology has become a central driver of accounting skill development, as modern accounting practice relies heavily on digital tools and data-driven processes. Exposure to accounting software, simulations, and virtual case studies enables students to develop practical competencies aligned with professional standards. Evidence suggests that technology-enhanced learning environments significantly improve students' readiness for the accounting workplace (Pan & Seow, 2016).

In Nigerian universities, accounting skill development faces challenges related to limited access to modern accounting tools and inconsistent instructional methods. Integrating e-learning platforms and virtual classrooms into accounting education offers opportunities to address these gaps by providing scalable and practice-oriented learning experiences. Understanding the nature of accounting skill development is therefore critical for assessing the effectiveness of digital learning environments in accounting education.

Types of E-Learning Platforms for Accounting Education

1. **Learning Management Systems (LMS):** Learning Management Systems are comprehensive digital platforms used to organise, deliver, and manage accounting courses in higher education. They provide structured spaces for uploading lecture materials, administering assessments, facilitating discussions, and tracking student progress. In accounting education, LMS platforms support the systematic delivery of theoretical concepts alongside problem-solving exercises and case studies. Research indicates that LMS-based instruction enhances learner engagement and supports continuous assessment, which are critical for mastering accounting principles and procedures (Garrison & Vaughan, 2013).

2. **Cloud-Based Accounting Software Platforms:** Cloud-based accounting software platforms provide students with hands-on exposure to real-world accounting tools used in professional practice. These platforms allow learners to perform bookkeeping, financial reporting, and data analysis tasks in simulated or live business environments. By integrating such software into accounting instruction, universities help bridge the gap between theory and practice. Studies have shown that exposure to cloud-based accounting applications significantly improves students' practical competence and workplace readiness (Boulianne, 2019).

3. **Virtual Classroom and Video Conferencing Platforms:** Virtual classroom platforms enable synchronous teaching and learning through live video sessions, screen sharing, and interactive discussions. In accounting education, these platforms are particularly useful for demonstrating calculations, explaining complex standards, and guiding students through practical exercises in real time. Empirical evidence suggests that synchronous

online instruction enhances student participation and conceptual understanding when combined with interactive teaching strategies (Martin & Bolliger, 2018).

4. **Massive Open Online Course (MOOC) Platforms:** MOOC platforms provide access to large-scale accounting courses delivered by universities and professional bodies. These platforms support self-paced learning through video lectures, quizzes, and peer interaction. In accounting education, MOOCs offer supplementary learning opportunities that allow students to reinforce classroom instruction and explore specialised topics. Research has shown that MOOCs contribute to lifelong learning and skill enhancement, particularly when learners actively engage with course activities (Hew & Cheung, 2014).

5. **Simulation-Based Learning Platforms:** Simulation-based e-learning platforms replicate real-world accounting scenarios, enabling students to practise decision-making in controlled digital environments. These platforms often include virtual firms, financial simulations, and auditing cases that require learners to apply accounting knowledge to dynamic situations. Educational research suggests that simulation-based learning enhances critical thinking and problem-solving skills, which are essential competencies for accounting professionals (Apostolou et al., 2017).

6. **Mobile Learning Platforms:** Mobile learning platforms deliver accounting content through smartphones and tablets, allowing learners to access materials anytime and anywhere. These platforms support microlearning, quizzes, and interactive content that complement formal accounting instruction. Studies indicate that mobile learning increases learner flexibility and engagement, making it a valuable tool for reinforcing accounting concepts and supporting continuous skill development (Crompton & Burke, 2018).

7. **Collaborative and Social Learning Platforms:** Collaborative e-learning platforms facilitate peer interaction, group problem-solving, and knowledge sharing through discussion boards, shared documents, and social learning tools. In accounting education, these platforms support collaborative case analysis, peer review, and team-based projects that mirror professional accounting practices. Research has shown that collaborative learning environments enhance communication skills and deepen understanding through social interaction and collective reasoning (Hrastinski, 2019).

Synchronous Learning Mode

Synchronous learning refers to real-time, instructor-led teaching and learning activities conducted through digital platforms where students and lecturers interact

simultaneously despite being geographically dispersed. In accounting education, synchronous learning typically occurs through virtual classrooms that support live lectures, discussions, screen sharing, and instant feedback. This mode closely mirrors the traditional face-to-face classroom and allows accounting lecturers to explain complex numerical concepts, standards, and procedures interactively, thereby enhancing immediacy and instructional clarity (Martin & Bolliger, 2018).

A key strength of synchronous learning in accounting education lies in its capacity to promote active engagement and immediate clarification of difficult concepts. Accounting topics such as financial statement preparation, cost analysis, and auditing procedures often require step-by-step explanations that benefit from live demonstrations and real-time questioning. Research has shown that synchronous online sessions improve students' cognitive engagement and understanding when interactive strategies such as questioning, polling, and collaborative problem-solving are employed (Hrastinski, 2008).

Synchronous learning also supports collaborative skill development among accounting students through group discussions, breakout sessions, and joint problem-solving tasks. These collaborative activities mirror professional accounting environments where teamwork and communication are essential. Studies indicate that real-time online collaboration fosters deeper learning and enhances students' professional competencies, including analytical reasoning and communication skills (Garrison et al., 2010).

However, the effectiveness of synchronous learning in Nigerian universities is often constrained by contextual factors such as unstable internet connectivity, limited access to digital devices, and scheduling challenges. These limitations can reduce student participation and affect learning continuity, particularly in accounting courses that require sustained engagement. Despite these challenges, synchronous learning remains a vital component of e-learning platforms for accounting skill development when adequately supported by institutional infrastructure and pedagogical planning (Eze et al., 2018).

Asynchronous Learning Mode

Asynchronous learning refers to instructional activities that do not require real-time interaction between students and instructors, allowing learners to access materials and complete tasks at their own pace. In accounting education, asynchronous learning is commonly delivered through learning management systems that host recorded lectures, reading materials, discussion forums, and self-assessment tools. This mode provides flexibility that is particularly beneficial for mastering accounting concepts that require repeated practice and reflection (Means et al., 2014).

One of the major advantages of asynchronous learning in accounting education is its support for self-directed and reflective learning. Accounting students can revisit

recorded explanations, practise problem sets multiple times, and engage with supplementary resources to strengthen their understanding. Research suggests that asynchronous environments enhance learner autonomy and promote deeper cognitive processing, which are critical for developing analytical accounting skills (Garrison & Vaughan, 2013).

Asynchronous discussion forums also play an important role in facilitating interaction and collaborative learning among accounting students. Through these platforms, learners analyse case studies, discuss accounting standards, and respond to peers' contributions over extended periods. Such reflective discussions allow students to articulate their reasoning clearly and engage critically with diverse perspectives, thereby supporting higher-order thinking skills essential for accounting practice (Apostolou et al., 2017).

In the Nigerian university context, asynchronous learning offers practical solutions to challenges associated with time constraints and infrastructural limitations. Students who face connectivity issues or competing responsibilities can still participate meaningfully in accounting courses through flexible access to learning materials. Nevertheless, the absence of immediate feedback and reduced real-time interaction may affect motivation if not carefully managed. Effective instructional design and consistent lecturer presence are therefore essential to maximise the benefits of asynchronous learning for accounting skill development (Adebayo & Abdulhamid, 2019).

Virtual Simulations and Online Practical Sessions

Virtual simulations and online practical sessions represent innovative instructional approaches that enable accounting students to engage in experiential learning within digitally mediated environments. Virtual simulations replicate real-world accounting contexts such as business transactions, financial reporting processes, auditing scenarios, and managerial decision-making tasks. These tools allow learners to apply theoretical concepts in realistic settings without the risks associated with real organisational operations. Educational research suggests that simulation-based learning enhances conceptual understanding and promotes active engagement by immersing students in authentic professional experiences (Apostolou et al., 2017).

In accounting education, online practical sessions complement virtual simulations by providing structured opportunities for hands-on practice using accounting software and digital tools. Through these sessions, students perform tasks such as journal entries, ledger posting, financial statement preparation, and data analysis under guided instruction. Online practical sessions often incorporate screen-sharing, step-by-step demonstrations, and supervised exercises, which facilitate skill acquisition in complex accounting procedures. Studies indicate that practice-oriented digital

instruction significantly improves students' technical competence and confidence in applying accounting knowledge (Boulianne, 2019).

Virtual simulations and online practical sessions also contribute to the development of higher-order accounting skills, including problem-solving, critical thinking, and professional judgement. By engaging with dynamic scenarios that require decision-making and analysis, students learn to interpret financial information and respond to changing business conditions. Research has shown that simulation-based environments foster reflective learning and enhance students' ability to transfer classroom knowledge to professional contexts, which is essential for accounting practice (Pan & Seow, 2016).

In the context of Nigerian universities, virtual simulations and online practical sessions offer viable solutions to challenges such as limited access to physical accounting laboratories and modern accounting software. These digital approaches enable institutions to provide scalable and flexible practical training opportunities despite infrastructural constraints. However, effective implementation depends on reliable digital infrastructure, lecturer competence, and institutional support. When adequately integrated into accounting curricula, virtual simulations and online practical sessions can significantly enhance accounting skill development among university students (Adebayo & Abdulhamid, 2019).

Assessment and Feedback in Virtual Accounting Classes

Assessment and feedback are integral components of virtual accounting classes, as they determine the extent to which students acquire the knowledge and skills required for professional accounting practice. In digital learning environments, assessment goes beyond measuring theoretical understanding to evaluating practical competencies such as problem-solving, analytical reasoning, and the application of accounting standards. Scholars argue that effective online assessment must be aligned with learning outcomes and supported by appropriate technological tools to ensure validity and reliability (Gikandi et al., 2011).

Virtual accounting classes employ a range of assessment methods, including online quizzes, case-based assignments, project work, and simulation-driven tasks. These approaches allow instructors to evaluate both individual and collaborative learning outcomes while accommodating diverse learning styles. In accounting education, case-based and problem-oriented assessments are particularly valuable because they require students to analyse financial information and make informed judgements. Research indicates that authentic assessments enhance learners' ability to transfer accounting knowledge to real-world contexts (Apostolou et al., 2017).

Feedback in virtual accounting classes plays a critical role in guiding student learning and improving performance. Digital platforms enable timely and detailed feedback through automated responses, annotated submissions, audio comments, and live

review sessions. Effective feedback helps students identify errors in calculations, understand conceptual gaps, and refine their analytical approaches. Studies have shown that prompt and constructive feedback significantly enhances learner engagement and supports continuous improvement in online learning environments (Hattie & Timperley, 2007).

The use of technology in virtual accounting assessment also supports formative evaluation, which focuses on monitoring learning progress rather than solely measuring final outcomes. Formative assessments such as self-tests, reflective journals, and peer assessments encourage students to take responsibility for their learning and develop self-regulatory skills. In accounting education, formative feedback helps learners build confidence and competence by allowing repeated practice and reflection, which are essential for mastering complex accounting procedures (Nicol & Macfarlane-Dick, 2006).

Despite its advantages, assessment and feedback in virtual accounting classes face challenges related to academic integrity, student motivation, and technological constraints. Issues such as examination malpractice, limited access to stable internet, and varying levels of digital literacy can affect assessment quality and fairness. Addressing these challenges requires the adoption of robust assessment designs, clear guidelines, and continuous lecturer support. When effectively implemented, assessment and feedback mechanisms in virtual accounting classes can significantly enhance accounting skill development and learning outcomes (Adebayo & Abdulhamid, 2019).

Skill Acquisition through Online Learning

Skill acquisition through online learning has become a central concern in accounting education as universities increasingly rely on digital platforms to prepare students for professional practice. Online learning environments provide structured opportunities for students to develop accounting knowledge and competencies through multimedia resources, interactive tasks, and guided instruction. Scholars note that when online learning is intentionally designed, it can support both cognitive and practical skill development by promoting active engagement and application of knowledge (Means et al., 2014).

In accounting education, online learning supports the acquisition of technical skills such as bookkeeping, financial reporting, auditing, and data analysis through the use of digital tools and software applications. E-learning platforms enable students to practise accounting procedures repeatedly, access demonstrations, and receive guided instruction, which enhances procedural accuracy and confidence. Research indicates that exposure to technology-enhanced accounting instruction improves students' technical proficiency and readiness for professional roles (Boulianne, 2019).

Beyond technical competencies, online learning also facilitates the development of higher-order skills essential for accounting practice, including analytical thinking, problem-solving, and professional judgement. Through case-based learning, simulations, and collaborative tasks, students are encouraged to interpret financial information, evaluate alternatives, and make informed decisions. Studies have shown that online problem-based learning environments foster critical thinking and support the transfer of accounting knowledge to real-world contexts (Apostolou et al., 2017).

Online learning further promotes self-directed and lifelong learning skills by requiring students to manage their learning processes independently. Accounting students in virtual environments must plan their study schedules, monitor their progress, and seek feedback proactively. These self-regulatory skills are highly valued in the accounting profession, where continuous learning is essential due to evolving standards and technologies. Educational research suggests that online learning environments enhance learner autonomy and self-efficacy when supported by effective instructional design (Garrison & Vaughan, 2013).

In the context of Nigerian universities, skill acquisition through online learning offers opportunities to address limitations in physical infrastructure and expand access to practical accounting education. However, challenges such as limited digital resources, inconsistent internet connectivity, and varying levels of digital literacy can affect learning outcomes. Addressing these challenges requires institutional investment and pedagogical support to ensure that online learning environments effectively contribute to accounting skill development. When these conditions are met, online learning can serve as a powerful tool for developing competent and adaptable accounting graduates (Adebayo & Abdulhamid, 2019).

Advantages of Virtual Accounting Instructions

1. **Enhanced Accessibility and Learning Flexibility:** Virtual accounting instruction increases access to accounting education by removing geographical and time constraints that limit participation in traditional classrooms. Students can attend lectures, access learning materials, and complete assignments regardless of location, which is particularly beneficial in contexts with limited physical infrastructure. Research indicates that flexible learning environments improve participation and continuity in higher education, especially in professional disciplines such as accounting (Means et al., 2014).

2. **Improved Exposure to Accounting Technologies:** Virtual accounting instruction facilitates direct engagement with digital accounting tools and software that reflect contemporary professional practice. Through online platforms, students gain hands-on experience with accounting applications, simulations, and data analysis tools that enhance their technical competence.

Studies have shown that technology-enhanced accounting instruction significantly improves students' readiness for the modern workplace (Boulianne, 2019).

3. **Support for Experiential and Skills-Based Learning:** Virtual accounting environments support experiential learning by integrating simulations, case studies, and practical exercises into instruction. These approaches allow students to apply accounting principles to realistic scenarios, thereby strengthening problem-solving and analytical skills. Educational research suggests that experiential learning methods enhance skill acquisition and knowledge retention in accounting education (Apostolou et al., 2017).

4. **Timely Assessment and Feedback Mechanisms:** Online accounting instruction enables the use of automated and instructor-mediated feedback tools that provide timely responses to student work. Prompt feedback helps learners identify errors, refine their understanding, and improve performance in accounting tasks. Studies have demonstrated that effective feedback is a key determinant of learning success in online environments (Hattie & Timperley, 2007).

5. **Promotion of Collaborative Learning and Professional Skills:** Virtual accounting instruction supports collaboration through discussion forums, group projects, and real-time interactive sessions. These collaborative activities foster communication, teamwork, and professional interaction skills that are essential in accounting practice. Research indicates that collaborative online learning environments enhance engagement and deepen understanding through peer interaction (Hrastinski, 2019).

6. **Cost Efficiency and Resource Optimisation:** Virtual accounting instruction reduces the need for extensive physical infrastructure and allows institutions to optimise instructional resources. Digital materials, reusable content, and scalable platforms lower long-term instructional costs while maintaining quality. Evidence suggests that online learning models can be cost-effective and sustainable when appropriately implemented in higher education (Garrison & Vaughan, 2013).

Barriers to Effective E-Learning Implementation

1. **Inadequate Digital Infrastructure:** Inadequate digital infrastructure remains a major barrier to effective e-learning implementation, particularly in developing higher education contexts. Reliable internet connectivity, stable power supply, and access to appropriate hardware are fundamental requirements for successful online learning. When these elements are lacking, students and instructors experience disruptions that undermine instructional delivery and learner engagement. Empirical studies have shown

that infrastructural deficiencies significantly reduce the effectiveness of e-learning systems and limit their pedagogical potential (Adebayo & Abdulhamid, 2019).

2. **Limited Digital Competence of Instructors and Students:** The effectiveness of e-learning depends largely on the digital skills of both instructors and learners. Many educators lack adequate training in online pedagogy, instructional design, and the use of digital learning tools, which affects course quality and student engagement. Similarly, students with low digital literacy may struggle to navigate e-learning platforms effectively. Research indicates that insufficient digital competence negatively influences participation, learning outcomes, and overall satisfaction with e-learning environments (Eze et al., 2018).

3. **Pedagogical and Instructional Design Challenges:** Poor instructional design is a critical barrier to effective e-learning implementation. Simply transferring traditional face-to-face teaching methods to online platforms without pedagogical adaptation often results in passive learning and low engagement. Effective e-learning requires learner-centred design, interactive content, and clear alignment between learning objectives, activities, and assessments. Studies have shown that weak pedagogical frameworks reduce the instructional effectiveness of e-learning programmes (Garrison & Vaughan, 2013).

4. **Learner Motivation and Engagement Issues:** Maintaining student motivation and engagement in e-learning environments is a persistent challenge. The absence of physical classroom interaction can lead to feelings of isolation, reduced accountability, and diminished interest in learning activities. Learners who lack self-regulation skills may find it difficult to manage their time and sustain engagement. Research suggests that low motivation and weak interaction significantly contribute to poor completion rates and limited learning gains in e-learning contexts (Hartnett, 2016).

5. **Assessment Integrity and Quality Concerns:** Ensuring the credibility and fairness of online assessments presents another major barrier to effective e-learning. Challenges such as academic dishonesty, limited supervision, and difficulties in assessing practical skills raise concerns about the validity of online evaluation methods. These issues can compromise learning outcomes and stakeholder confidence in e-learning systems. Studies indicate that without robust assessment strategies and monitoring mechanisms, the quality of e-learning assessment may be significantly undermined (Gikandi et al., 2011).

6. **Institutional and Policy Constraints:** Institutional readiness and supportive policy frameworks are essential for sustainable e-learning implementation. Inadequate funding, weak administrative support, and the absence of clear e-learning policies often hinder effective adoption. When institutions fail to prioritise capacity building, technical support, and quality assurance, e-learning initiatives struggle to achieve their intended goals. Research has shown that strong institutional commitment and coherent policy direction are critical determinants of successful e-learning implementation (Organisation for Economic Co-operation and Developmen: OECD, 2015).

Conclusion

In conclusion, the integration of e-learning platforms and virtual classrooms in accounting education presents significant opportunities for enhancing skill acquisition, practical competence, and professional readiness among university students. By facilitating flexible, interactive, and technology-driven learning experiences, these digital tools bridge the gap between theoretical knowledge and real-world accounting practice. Despite challenges such as infrastructural limitations, digital literacy gaps, and motivational issues, the strategic implementation of online learning, virtual simulations, and effective assessment mechanisms can transform accounting instruction and support the development of competent, adaptable, and workplace-ready graduates.

Suggestions

1. Nigerian universities should invest in robust digital infrastructure and reliable internet access to support effective e-learning and virtual classroom implementation.
2. Continuous training and capacity-building programs for lecturers and students should be provided to enhance digital literacy and online teaching competencies.
3. E-learning platforms should incorporate interactive simulations, practical exercises, and timely feedback to strengthen accounting skill development and engagement.

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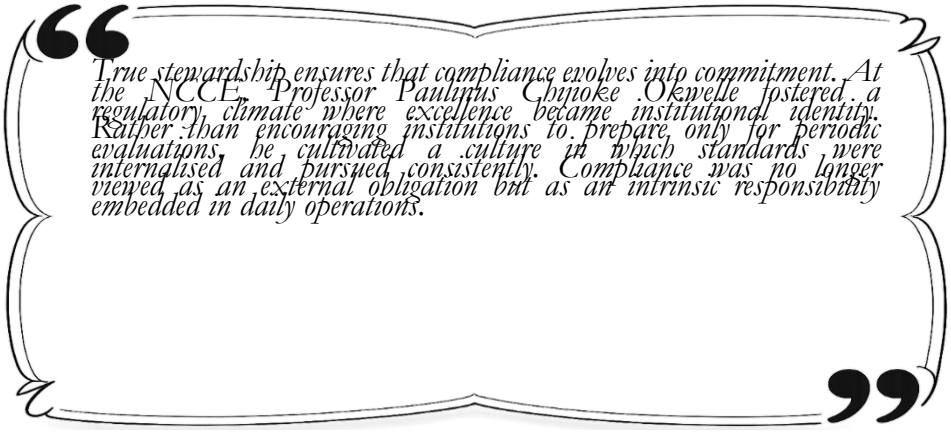
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Chapter 56

Applying The Will-Skill-Tool-Pedagogy Framework to Address ICT Challenges in Mathematics Education in Delta State, Nigeria

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&

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Abstract

The use of Information and Communication Technology (ICT) in mathematics education is largely recognized for its potential to improve teaching, promote interactive learning, and boost student motivation. Despite this potential, many mathematics teachers still struggle with effectively using ICT tools in their teaching. This research explores the degree to which mathematics teachers use ICT in their teaching practice, using the Will-Skill-Tool-Pedagogy (WSTP) framework as a reference. Taking a qualitative case study design, data were collected via semi-structured interviews and classroom observations from a purposive sample of 100 mathematics teachers drawn from a population of teachers in Oshimili South Local Government Area, Delta State Nigeria. The study concentrates on the teachers' willingness, their ability in using technology, access to ICT tools, and pedagogical approaches used in teaching mathematics. The results show varied levels of ICT adoption, driven by diverse factors such as poor infrastructure, limited training, and irregular access to functional digital devices. Whereas some teachers demonstrate ample motivation and innovative approaches, others have serious challenges that undercut effective ICT use. The study concludes with suggestions for targeted teacher professional development, improved provision and maintenance of ICT infrastructure, and supportive policy interventions for bridging the gap between implementation and intention. These findings are expected to inform policymakers, educational managers, and stakeholders as they strive to promote sustainable, ICT-supported mathematics teaching in Delta State and Nigeria at large.

Keywords: *ICT, mathematics education, pedagogy, teaching, tools*

Introduction

The integration of Information and Communication Technology (ICT) in mathematics education has been widely acknowledged as a transformative approach to improving teaching effectiveness and fostering greater student engagement. Digital tools, ranging from interactive software to online collaborative platforms, have the potential to reshape traditional classroom practices by promoting active participation, individualized learning, and problem-solving through dynamic visualizations and simulations. As these technologies increasingly permeate educational settings, educators are encouraged to adopt ICT not merely as supplementary aids but as integral components of pedagogy that support more interactive and student-centred learning experiences (Sawyerr & Agyei, 2023). Such integration allows learners to explore mathematical concepts in ways that are more accessible, engaging, and aligned with contemporary digital literacy demands. Despite these promising benefits, the adoption of ICT in mathematics instruction remains uneven and fraught with challenges. One major obstacle is limited teacher readiness, as many educators lack the confidence or specialized training required to effectively incorporate ICT into subject-specific contexts. General digital skills alone are insufficient; teachers must develop expertise in applying technology to mathematical problem-solving and instructional design. In addition, infrastructural deficits—such as unreliable internet connectivity, inadequate access to devices, and insufficient technical support—significantly constrain the consistent use of ICT in classrooms. These limitations often lead to frustration and withdrawal from technology-based practices. Furthermore, resistance to pedagogical change persists, with some educators reluctant to shift from traditional methods to more innovative, technology-driven approaches (Brianza et al., 2024; Clark-Wilson et al., 2023). This resistance may stem from concerns about curriculum alignment, time constraints, or the perceived complexity of integrating new tools.

A key issue in ICT integration within mathematics education is the varying levels of teacher preparedness, which can be effectively analyzed through the Will-Skill-Tool-Pedagogy (WSTP) model. This framework highlights four interdependent dimensions that determine the success of ICT adoption: teachers' willingness to embrace technology, their skill levels in applying it, access to the necessary tools, and the pedagogical strategies they employ (Sawyerr, 2021). Each of these components plays a critical role, and deficiencies in any one area can undermine the overall effectiveness of technology-driven teaching. For instance, while some teachers may demonstrate enthusiasm for ICT use, they may lack the technical expertise to integrate digital tools meaningfully into mathematics instruction. Conversely, others may possess adequate skills but face infrastructural limitations, such as unreliable internet connectivity or insufficient access to devices, which restrict their ability to implement ICT practices consistently.

Research further indicates that systemic barriers exacerbate these challenges. Inadequate training opportunities often leave teachers ill-equipped to adapt to evolving technological demands, while limited institutional support reduces their confidence in experimenting with innovative practices. Inconsistent curriculum policies also create uncertainty, making it difficult for educators to align ICT use with broader educational objectives (Mumtaz, 2000; McCulloch et al., 2018). These structural issues highlight the need for comprehensive strategies that go beyond individual teacher readiness to address systemic conditions that shape classroom realities.

Moreover, scholars emphasize that successful ICT integration requires more than technical competence or resource availability; it necessitates a fundamental shift in pedagogical beliefs and attitudes. Ertmer (2005) argued that deep-seated beliefs about teaching and learning significantly influence whether teachers adopt technology in their instructional practices. Teachers who view ICT as a tool for enhancing student-centered learning are more likely to integrate it effectively, while those who perceive it as disruptive may resist its use. Thus, fostering positive attitudes and reshaping pedagogical perspectives are essential steps toward sustainable ICT adoption in mathematics education.

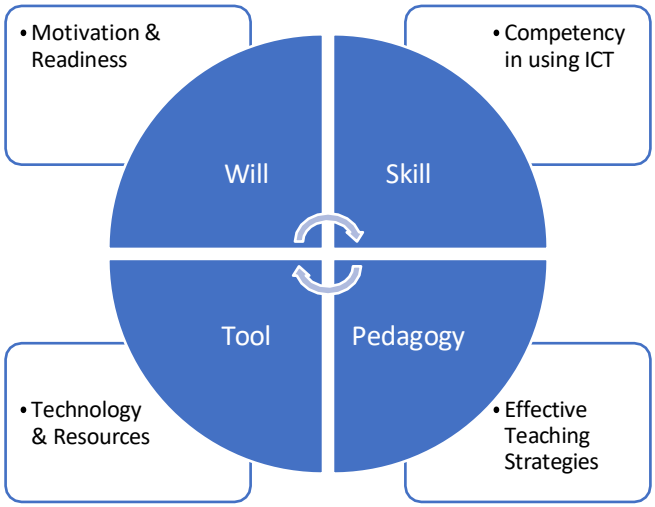


Figure 1: The WSTP framework

The diagram above illustrates the Will-Skill-Tool-Pedagogy (WSTP) model, a comprehensive framework designed to guide and evaluate the effective integration of Information and Communication Technology (ICT) in education, with particular relevance to mathematics instruction. This model recognizes that successful ICT

adoption is not a linear process but a dynamic interplay of four essential components—each contributing to and reinforcing the others.

Will – Motivation & Readiness

This quadrant emphasizes the psychological and emotional readiness of educators to embrace technology. Teachers must possess a genuine willingness to integrate ICT into their teaching practices, which stems from intrinsic motivation, confidence, and a belief in the value of technology for enhancing learning. Without this foundational drive, even the most advanced tools and training may be underutilized. Cultivating this "will" involves creating a supportive culture that encourages experimentation, celebrates innovation, and addresses fears or resistance to change.

Skill – Competency in Using ICT

Skill refers to the practical ability of teachers to use ICT tools effectively. It goes beyond general digital literacy to include subject-specific competencies—particularly in mathematics, where educators must be adept at using software for graphing, simulations, data analysis, and interactive problem-solving. Professional development programs must therefore be tailored to equip teachers with both technical know-how and pedagogical insight into how these tools can enrich mathematical understanding.

Tool – Technology & Resources

This component focuses on the availability and accessibility of ICT infrastructure. Teachers need reliable hardware, software, and internet connectivity to implement technology-enhanced lessons. The absence of these resources can severely limit ICT integration, regardless of a teacher's motivation or skill level. Investment in infrastructure, maintenance, and technical support is thus critical to sustaining ICT use in classrooms.

Pedagogy – Effective Teaching Strategies

Pedagogy addresses how ICT is embedded within instructional design. It's not enough to have tools; educators must know how to use them to support learning objectives, differentiate instruction, and engage students meaningfully. This involves rethinking traditional teaching methods and adopting strategies that leverage technology to foster inquiry, collaboration, and deeper conceptual understanding.

The circular arrows at the center of the diagram highlight the interconnectedness of these elements. Strengthening one area can positively influence the others—for instance, access to better tools may inspire motivation, while pedagogical training can enhance ICT skills. The cyclical nature of the model underscores the need for a

holistic and sustained approach to ICT integration, where continuous improvement in one domain fuels growth across the entire system.

Overcoming ICT barriers in mathematics education requires a comprehensive and holistic approach that goes beyond isolated interventions. It involves addressing the interconnected dimensions of teachers' attitudes, competencies, access to resources, and instructional strategies. The Will-Skill-Tool-Pedagogy (WSTP) framework provides a structured lens through which these challenges can be examined and resolved. By emphasizing the importance of teacher willingness, technical proficiency, resource availability, and pedagogical innovation, the framework ensures that ICT integration is not only possible but sustainable. Teachers must first demonstrate readiness and motivation to embrace technology, as attitudes and beliefs strongly influence adoption. Equally important is the development of technical skills, which must be subject-specific to mathematics in order to translate digital tools into meaningful learning experiences. Access to reliable infrastructure and technological resources forms another critical pillar, as even motivated and skilled educators are constrained without adequate tools. Finally, pedagogy plays a decisive role, requiring teachers to adapt their instructional strategies to incorporate ICT in ways that enhance student engagement and conceptual understanding.

This study therefore seeks to explore the extent to which both teachers and students in mathematics education utilize ICT tools, guided by the WSTP framework. Specifically, it investigates teachers' willingness to adopt technology, their technical competencies, the adequacy of technological resources available to them, and the pedagogical approaches they employ in integrating ICT into classroom practice. By examining these dimensions collectively, the study aims to provide insights into the strengths and gaps in current ICT integration efforts. Ultimately, the findings will contribute to a deeper understanding of how ICT can be leveraged to improve mathematics teaching and learning, while offering recommendations for policy, professional development, and infrastructural investment that align with the WSTP framework.

Statement of the Problem

Despite the increasing emphasis on integrating Information and Communication Technology (ICT) in mathematics education, many teachers continue to struggle with its effective utilization. While ICT offers opportunities to enhance teaching effectiveness, foster student engagement, and promote interactive learning, its adoption in mathematics classrooms remains inconsistent. The readiness of teachers to embrace ICT is shaped by three critical dimensions: will, skill, and tool availability. Will refers to teachers' motivation, attitudes, and willingness to incorporate technology into their instructional practices. Without a positive disposition and readiness to change, even well-designed ICT initiatives may fail. Skill encompasses the competence and proficiency required to use ICT tools

effectively, particularly in subject-specific contexts such as mathematics, where digital applications can support visualization, problem-solving, and data analysis. Tool availability highlights the importance of access to infrastructure and resources, including reliable internet connectivity, functional devices, and appropriate software. However, limited research has systematically examined how these three factors interact to determine ICT adoption in mathematics classrooms. Much of the existing literature tends to focus on individual components in isolation, overlooking the complex interplay between teacher motivation, technical competence, and infrastructural support. This gap is particularly evident in Nigeria, where educational reforms increasingly emphasize digital integration but face challenges related to resource constraints and teacher preparedness. This study therefore seeks to explore the extent to which teachers' will, skill, and tool readiness influence the use of ICT for mathematics instruction in Nigeria. By investigating these dimensions collectively, the research aims to provide a nuanced understanding of the barriers and enablers of ICT integration. The findings are expected to inform policy, professional development programs, and infrastructural investments, ultimately contributing to more effective and sustainable ICT adoption in mathematics education across Nigerian schools.

Purposes of the Study

The purpose of this study is to explore how secondary school mathematics teachers' willingness, skills, access to ICT tools, and pedagogical practices influence their experiences and challenges in integrating ICT into classroom teaching.

Research Questions

How do secondary school mathematics teachers' willingness, skills, access to tools, and pedagogical practices shape their experiences and challenges in integrating ICT into classroom teaching?

Methodology

This study adopts a **qualitative research approach** to explore the application of ICT in mathematics education within Oshimili South Local Government Area of Delta State. The qualitative design was chosen because it allows for a rich, contextualized understanding of teachers' experiences, attitudes, and practices, rather than relying solely on numerical data. The focus is on uncovering the depth of teachers' willingness, skills, and access to ICT tools in their pedagogical practices. A **case study design** was employed, following Yin (2018), who defines case study research as an in-depth investigation of a single case or multiple cases within their real-world context. This design is particularly appropriate for examining ICT integration in mathematics classrooms, as it enables detailed analysis of the contextual factors—

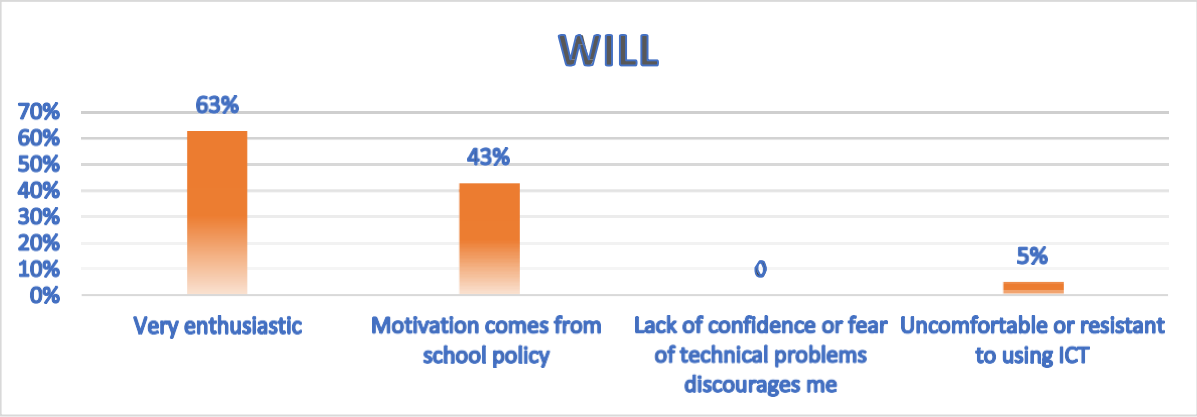
such as institutional support, infrastructural availability, and teacher beliefs—that influence adoption.

The **target population** consisted of secondary school mathematics teachers in Oshimili South Local Government Area, with an estimated population of approximately 50 teachers. From this population, a **purposive sampling technique** was applied to select participants who had prior experience with ICT tools in teaching mathematics. This ensured that the study captured insights from teachers who were directly involved in ICT-related practices. A total of **15 mathematics teachers formed the sample size**, providing a manageable yet sufficiently diverse group for in-depth qualitative exploration.

Data collection was conducted through **semi-structured interviews**, which allowed flexibility for probing deeper into participants' responses while maintaining consistency across key themes. The interview questions were guided by the Will-Skill-Tool-Pedagogy (WSTP) framework, focusing on teachers' motivation (will), technical competence (skill), access to resources (tool), and instructional strategies (pedagogy). For **data analysis**, responses were coded thematically to identify recurring patterns and insights. Percentages and graphical representations were used to highlight key trends across the sample, providing a visual summary of findings while retaining the qualitative depth of individual experiences. This mixed descriptive approach ensured that both narrative richness and comparative clarity were achieved.

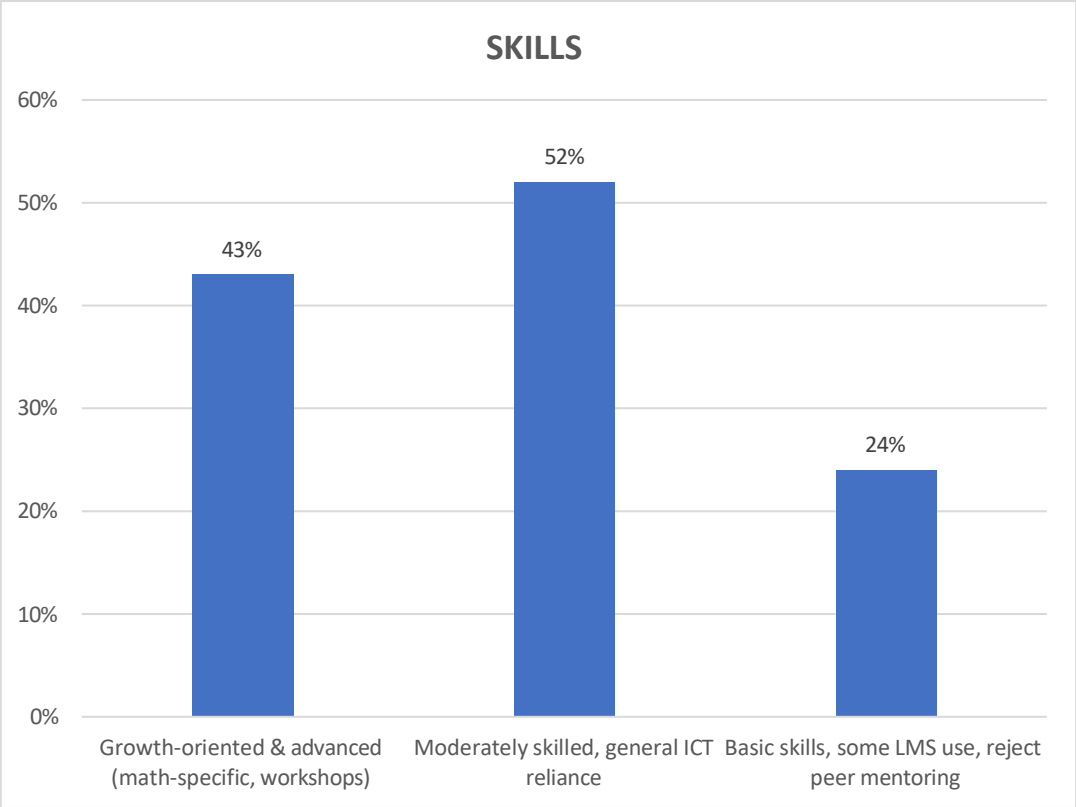
Results.

We first present a quantitative overview of the data, then provide detail of the qualitative analysis by describing and illustrating each chart.

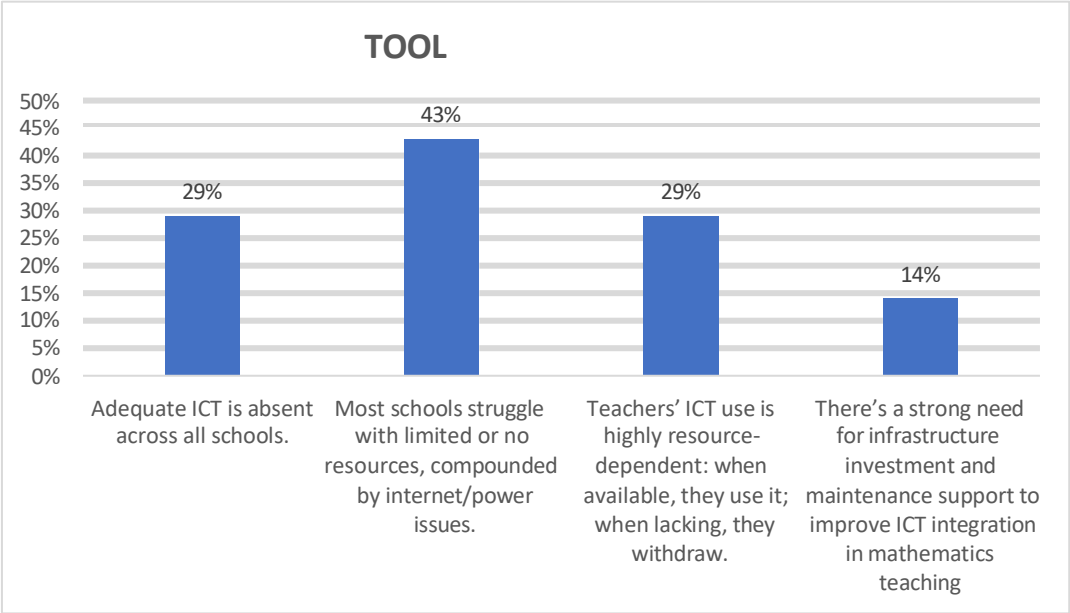


In terms of will, most teachers (63%) were very enthusiastic about the use of ICT, which indicates a strong positive disposition toward innovation and change. However, motivation was also shown to be policy-driven for 43% of teachers, suggesting that

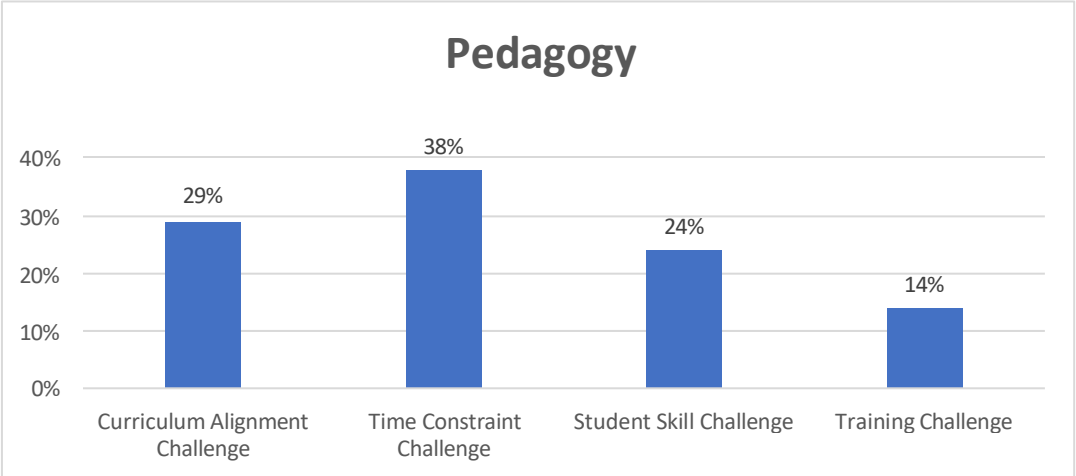
institutional mandates and expectations play a significant role in shaping attitudes. Only 5% expressed discomfort or resistance, implying that outright rejection of ICT is relatively rare, though it still represents a small but important barrier.



Looking at skills, a large proportion of teachers demonstrated moderate competence (52%), relying on general ICT skills rather than mathematics-specific applications. This suggests that while they are not entirely unskilled, their expertise often lacks depth in subject-specific pedagogical use. A smaller group (43%) showed growth-oriented and advanced skills, often gained through mathematics-specific workshops. By contrast, 24% remained at a basic level, limited to minimal learning management system (LMS) use and rejecting peer mentoring opportunities. These patterns highlight both promising progress and persistent gaps in professional development.



The tool dimension underscores systemic challenges. Nearly half of the schools (43%) struggle with limited or absent ICT resources, compounded by internet connectivity and power supply issues. Another 29% report complete absence of adequate ICT facilities, which significantly limits usage opportunities. Teachers' reliance on ICT is therefore highly resource-dependent—when facilities exist, they are used effectively; when absent, teachers withdraw (29%). This inconsistency signals that enthusiasm and skills cannot translate into practice without infrastructure. Moreover, 14% emphasized the urgent need for investment in infrastructure and maintenance support, showing that sustainable provision is as important as initial access.



From a pedagogical perspective, four key barriers emerge. The most pressing is time constraint (38%), with teachers struggling to plan ICT-based lessons amidst competing demands. Curriculum alignment (29%) poses another challenge, as teachers often find it difficult to integrate ICT meaningfully within existing mathematics objectives. Student-related challenges (24%) further complicate integration, with learners' varying ICT skills and engagement levels requiring differentiated support. Finally, lack of pedagogical training (14%) indicates that some teachers, even when motivated and resourced, lack the strategic know-how to effectively embed ICT into mathematics learning.

Discussion of Findings

The findings presented underscore several critical dimensions necessary for the successful integration of Information and Communication Technology (ICT) in mathematics education. At the heart of these dimensions lies the concept of **"will,"** which extends beyond policy-driven mandates and externally imposed directives. While enthusiasm for ICT use exists among educators, it is often shaped by external pressures such as curriculum reforms or institutional expectations, rather than intrinsic motivation. This externally mandated enthusiasm tends to be unsustainable, as teachers may comply with directives without fully embracing the transformative potential of ICT. Researchers such as Sawyer and Agyel (2023) and Ertmer (2005) emphasize that cultivating internal drive and self-efficacy is essential for meaningful engagement with technology. Teachers who believe in the value of ICT and feel confident in their ability to use it are more likely to integrate it consistently and innovatively into their teaching practices.

Equally vital is the development of **skills in subject-specific expertise.** General ICT proficiency, such as basic computer literacy, does not suffice for deep integration into mathematics instruction. Mathematics requires specialized applications of technology, including graphing software, dynamic geometry tools, statistical packages, and simulation platforms. Without targeted training, teachers may struggle to connect ICT use with mathematical concepts, resulting in superficial or ineffective integration. Studies by Pifrez et al. (2024) and Sealer-Aras & Tinker-Biber (2024) advocate for professional development programs tailored specifically to mathematics education. Such programs equip teachers with the knowledge and confidence to leverage digital tools in ways that enhance problem-solving, visualization, and conceptual understanding, thereby enriching the learning experience for students.

Another critical dimension is the **availability of tools and systemic infrastructure investment.** The findings reveal that access to reliable technological resources directly influences teachers' usage patterns. In environments where infrastructure is inadequate—such as schools with poor internet connectivity, insufficient devices, or lack of technical support—teachers often withdraw from ICT use altogether. This

withdrawal is not necessarily due to unwillingness or lack of skill, but rather the frustration and limitations imposed by unreliable systems. Hilbert et al. (2021) and Francom (2020) highlight the urgency of systemic investment in robust infrastructure and ongoing maintenance. Without such investment, ICT integration risks becoming inconsistent and unsustainable, particularly in resource-constrained contexts. Ensuring equitable access to tools is therefore fundamental to bridging the digital divide in mathematics education.

The final dimension relates to **pedagogical support,** which rounds out the framework for successful ICT integration. Teachers face diverse challenges in their classrooms, including time constraints, curriculum demands, and variations in student abilities and learning styles. These challenges require adaptive strategies that go beyond technical competence. Effective ICT integration demands a holistic approach that combines training, pedagogical adaptation, and institutional backing. Hyndman (2016) and Tourets et al. (2019) stress the importance of integrated support systems that empower educators to navigate these complexities. Such systems may include mentoring, collaborative learning communities, and ongoing professional development opportunities that help teachers refine their instructional strategies.

In total, the findings highlight that ICT integration in mathematics education is a multidimensional process requiring attention to motivation, skill development, infrastructure, and pedagogy. Each dimension is interconnected: improved infrastructure can enhance motivation, targeted training can build skills, and strong pedagogical support can sustain ICT use over time. The cyclical relationship among these factors suggests that addressing one area in isolation is insufficient. Instead, a comprehensive strategy that simultaneously strengthens all four dimensions is necessary to achieve meaningful and lasting ICT adoption.Ultimately, the study underscores that successful ICT integration is not merely about introducing technology into classrooms but about transforming teaching and learning practices. Teachers must be motivated, skilled, well-resourced, and pedagogically supported to harness the full potential of ICT in mathematics education. By addressing these dimensions holistically, educational systems can move closer to realizing the transformative promise of technology in fostering deeper student engagement, improved learning outcomes, and enhanced teaching effectiveness.

Conclusion

The integration of ICT into mathematics education demands a multifaceted and strategic approach. It is not enough to rely on policy mandates or general enthusiasm; educators must be intrinsically motivated and confident in their ability to use technology meaningfully. This requires targeted, subject-specific training that equips teachers with the skills to apply ICT tools effectively within mathematical contexts. Moreover, the success of such integration is heavily dependent on the availability of reliable infrastructure—without consistent access to resources, even the most

motivated educators may disengage. Pedagogical support must also be robust and adaptive, addressing the diverse challenges teachers face in real classroom settings. A holistic framework that combines motivation, expertise, infrastructure, and institutional backing is essential for ICT to truly enhance mathematics instruction. Only by addressing these interconnected factors can educational systems unlock the transformative potential of technology in fostering deeper learning and engagement in mathematics.

Recommendation

Moving forward, a holistic and sustained strategy addressing all components of the WSTP model is essential for transforming mathematics education with ICT.

1. Fostering **intrinsic will** is critical; teachers must be empowered with confidence, motivation, and a positive attitude toward technology use, ensuring that adoption is driven by genuine commitment rather than external mandates.
2. The development of **specific skills** is necessary, as general ICT competence is insufficient for mathematics instruction. Targeted, subject-specific training should equip teachers with the ability to apply digital tools effectively in teaching concepts such as algebra, geometry, and data analysis.
3. Ensuring access to **robust tools** requires systemic investment in reliable infrastructure, including functional devices, stable internet connectivity, and ongoing technical support.
4. Enhancing **pedagogical strategies** involves training teachers to integrate ICT into adaptive instructional methods that promote student-centered learning, collaboration, and deeper conceptual understanding.

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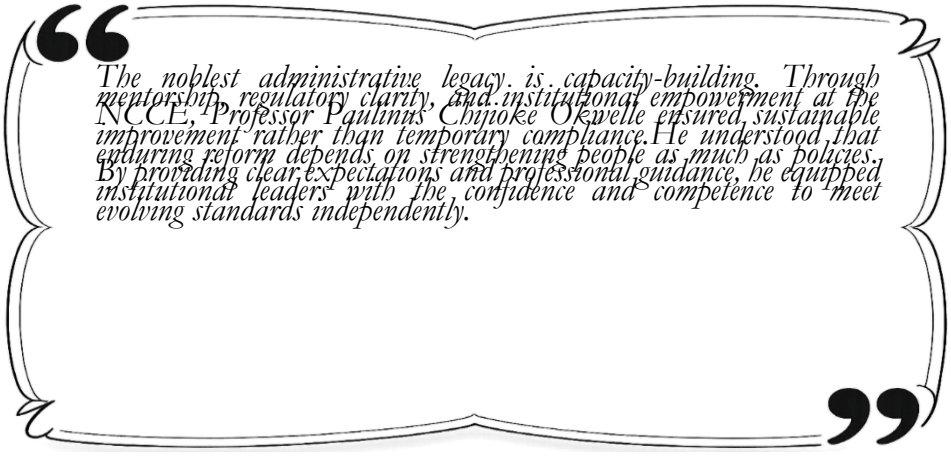
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Chapter 57

Service In Leadership: Panacea For Leader Challenges in Nigeria

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Abstract

The paper attempts an exposition of the concept of service leadership and the extent its application can help address the inept and leadership challenges in Nigeria which have adversely affected the development of Nigeria as a nation. The paper adopts a descriptive approach and content analysis as its methodological approach and concludes that the adoption of servant leadership concept would help to address the nation's leadership challenges and position the country on a good pedestal for growth and development. The paper recommends the early education of future leaders and reorientation of present leaders in Nigeria to imbibe and apply the desire in leadership strategy for the emergence of credible leadership at various levels in Nigeria.

Keywords: *Servant Leadership, Leadership Challenges in Nigeria, National Development, Inept Leadership, Descriptive Research Approach,*

Introduction

One of the major problems facing contemporary African countries is underdevelopment. At the height of this problem of underdevelopment is insecurity of lives and property. It is generally acknowledged that development cannot be achieved in an atmosphere of insecurity. Several factors have been identified as causes of the continued increase in security and development challenges of African states in general and Nigeria in particular.

It is important to emphasize that crisis of leadership has been identified as the primary and basic cause of underdevelopment, insecurity and backwardness in Nigeria. This is due to the fact that leadership is one of the essential determinants of development in any society. In fact, it has been observed that leadership has the greatest potential as the driving force of development, as well as the rallying point of the people's aspirations in any society.

Leadership Challenges in Nigeria

Leadership problems exist in Nigeria (Achebe, 1988; Mustapha, 2009). The subject of bad governance has received attention from many scholars at different times. Some are of the view that leadership challenges emanated from the emergence of colonial maladventure in Nigeria, while others argue that corruption and lack of vision among present and past leaders of the nation are the ills that have bedeviled the quest for good governance in the country.

According to Craig (2005), Transparency International (2006) and zurofa and Ochieng (2014), for over 50 years since Nigeria gained her political independence, the nation has experienced a continuous leadership problem which has culminated in poor infrastructure, resulting in the loss of trust in the leadership of the country by the citizenry. Leadership challenges in Nigeria are evident in political, social and economic instability and the prevalence of ethnic, communal and religious crises which have hampered the development of the Nigerian nation socially and economically. Some of the leadership challenges include:

1. Political instability
2. Absence of development-oriented leadership (most leaders are not committed to the development of the country)
3. Absence of accountability and transparency
4. Corruption
5. Electoral malpractice
6. Lack of political will
7. Lack of experience
8. Pressure on public servants
9. Emphasis on ethnic origin among others (Craig, 2005)

Literature has documented Nigeria's leadership crisis since her independence in 1960. This crisis is evidenced primarily in political instability and infrastructural weakness which has resulted in crime, corruption, poverty, lack of social cohesion and personal freedoms, environmental degradation, gender inequalities, social class differentials and deteriorating conditions of public works.

Political instability in Nigeria has been showcased since independence in 1960 through coups, counter coops and changes in government from civilian rule to

military government and to democratic rule, with key players remaining the same. Most of them have continued to remain in government in different dispensations, probably changing position from governors to national House of Assembly members, while some have returned to serve as president of the nation for the second time after serving out their initial tenures.

This has resulted in recycling of the same ideas and persons who are not committed to good governance in the country. Instead, they turn around to enrich themselves through corrupt practices and flaunt their wealth in the society. This has led to social class differentials, gender inequality and lack of social cohesion among others.

On the other side are the jobless citizenry, most of who are poor and therefore get involved in crime and likes to meet up with social and other demands. Leadership challenges in Nigeria are also not only evident in political instability but also in social and economic instability and the prevalence of ethnic, communal and religious crises which have hampered the development of the Nigerian nation. In terms of challenges associated with infrastructural decay, the hopes of millions of Nigerians have been dashed due to repeated failure by successive political leaderships to provide good governance in Nigeria's public sector, which is needed to build sustainable infrastructure for the creative engagement of the citizens and to generate national development.

It is pertinent to state that the importance of infrastructure development in Nigeria cannot be overemphasized. It is at the core of good governance and public welfare. Good infrastructure development in Nigeria is critical to the overall development of the Nigerian economy, which in turn impacts the standard of living of all Nigerians.

Good infrastructure serves as a catalyst for economic growth and also provides the platform for the social-political transformation of the nation (Akinwale, 2007; Olaseni & Alade, 2012; Akinwale, 2010; Mbanefo 2000; Olaseni & Alade, 2012). These authors posit that nowhere in Nigeria's public sector is the need for transformation more compelling than the infrastructural sector.

Madueke (2008) observed that Nigeria is in dire need of transformation and suggested that additional research be conducted into the role of leadership in national development from the Nigerian experience. It has been noted that Nigeria's effort at attaining development will be elusive if the crisis of leadership is not holistically, objectively and sincerely addressed.

Nigeria has made several attempts in the past at restructuring the economy and reforming public sector governance through the introduction of public service reforms (Okonjo-Iweala, 2012). The government of Nigeria continues to implement various reforms, including privatization and concession of key services and infrastructure to private sector operators (Okonjo-Iweala & Osafo-Kwame, 2007). Despite the fact that poor leadership is identified as the primary cause of socio-

economic and political challenges facing Nigeria today, efforts aimed at addressing the crisis have proved abortive.

Studies have made suggestions on the adoption of some strategies to address the leadership challenges rocking the Nigerian nation, such as promotion of traditional institutions and giving traditional rulers more say in appointment of political appointees, establishment of leadership training school for traditional leaders among others. Also, Mustafa (2004) affirms that these reforms have not yet yielded the expected outcome partly because of problems emanating from poor leadership which has led to the low quality of life of the citizenry.

Leadership and Leaders Defined

The term leadership has been defined in several ways, North house (2013) defined Leadership as a process whereby an individual influences a group of individuals to achieve a common goal. Riggio and Murphy (2003) stated that leadership is a process by which a person influences others to accomplish an objective and directs the organization in a way that makes it more cohesive and coherent. These definitions identify leadership as a process involving an individual who is wielding some level of influence in such a manner as to bring about the accomplishment or fulfillment of certain objectives.

Researchers have defined a leader in different ways. A leader is a person of authority who exercises power for the purpose of influencing the behavior of others (Filey and House, 1969). According to Fielder and Garcia 1981, a leader is a person who is elected or appointed or who has emerged firm the group to direct and coordinate the group members effort toward some given goals. The leader generally plans, organizes, directs, supervises the activities of group members and develops and maintains sufficient cohesiveness and motivation among group members to keep them together as a functioning unit. In essence, a leader marshals and challenges people to transform a vision into reality.

Perhaps, the most comprehensive definition of a leader was provided by Winston and Patterson (2006), who posited that a leader is one or more people who selects, equips, trains and influences one or more followers who have diverse gifts, abilities and skills and focuses the followers to the organization's mission and objectives, causing the followers to willingly and enthusiastically expend spiritual, emotional and physical energy in a concerted coordinated effort to achieve the organizational mission and objectives. While this definition captures all the elements of leadership, Bass and Bass (2008) provided a definition of leadership that is very relevant to the conceptual framework of this paper. It states that "transformational leaders motivate their followers to do more than the followers originally intended and thought possible. The leader sets challenging expectations and achieves high standards of performance."

Leadership and leaders are not synonymous, but are analogous to one another. While leaders are expected to lead and influence their subordinates, leadership is a process of influencing people towards achieving a clear goal. It is imperative at this point to highlight some of the leadership styles and possibly identify the styles that are operational in Nigeria.

Leadership Styles

According to Okai (2013), leadership style describes the behaviour leaders exhibit in the course of directing subordinates to meet common goals. This implies that in a system, the leadership style could be seen through the behaviour the leader exhibits in the course of directing their followers to achieve stated objectives.

The function of a leader notwithstanding, the level of leadership is to initiate and influence followers and team workers towards achieving goals and objectives by directing, planning, organizing, budgeting and coordinating the organization. However, Ololube (2007) explained that leadership styles are the approaches used to motivate followers. He further opined that leadership styles should be selected and adapted to fit organizations, situations, groups and individuals.

Toolkit in Ololube (2007) identified seven leadership styles namely:

Autocratic Leadership Style

In this style of leadership, the leader alone dictates to the subordinate what should be done. This implies that in a system, the leader takes decisions alone and dictates to the team members or subordinates who are under him. In other words, he does not involve them in making decisions.

Autocratic leaders do not allow their subordinates to make use of their initiatives and discretion as they take absolute control of the work. There is impossibility of free flow of communication. A leader adopting this style of leadership maintains downward communication, that is, communication from super ordinates to subordinates (the least staff). Leaders using this style always reprimand their subordinates and hardly praise workers for good performance.

Okorie (2000) buttressed that this style of leadership tends to be personal in praise and criticism of the work of each member. Bradford and Lippitt in Ololube (2004) summarized the characteristics of autocratic style as follows:

- An autocratic leader is very conscious of his position
- He has little trust and faith in his subordinates
- He feels that pay is just reward for work and is the only reward that will motivate the workers
- He gives orders and demands that they be carried out; no questions are allowed and no explanation should be given

- Group members assume no responsibility for performance and merely do what they are told
- Production is good when the leader is present but drops in his absence

Bureaucratic Leadership Style

This style of leadership constitutes rules and regulations of the organization. Leaders in this case follow rules to the letter, no compromise, and also ensure that the subordinate follows procedures closely. Shaefer (2005) opined that bureaucratic leadership is useful in organizations where employees do routine tasks.

Sandrole (2007) explained that one of the setbacks of this type of leadership is that it is ineffective in teams and organizations that require flexibility, creativity or innovativeness. Bureaucratic style of leadership emphasizes effective supervision and efficiency, leads to unity of command, resulting into clarity and precision in the attainment of organizational goals.

Charismatic Leadership Style

Charismatic leadership style is transformational in nature. The charismatic leader relies on his aura, personality and inspirational qualities. He also relies on his ability, he is competent and tactical in approaching problems. In the system, a leader with charismatic leadership quality commands an unchallengeable respect among subordinates because they are adored and loved.

The negative side of charismatic leadership is the amount of confidence placed on the leader rather than on employees, and this can create the risk of a project or even an entire organization collapsing if the leader leaves (Ololube, 2013).

Democratic / Participative Leadership Style

The democratic leadership encourages people to participate and involve themselves in the decision-making process. The democratic leader encourages creativity and initiative. In a system, a leader who operates the democratic style of leadership promotes greater group productivity. Subordinates shaped by this type of leadership style are usually more relaxed, capable of achieving institutional objectives and are less aggressive.

Laissez-Faire Leadership Style

This style of leadership offers the subordinates complete freedom to do their work and set their own ultimatums. The teams are provided with resources and advice, if needed, but otherwise do not get involved. The leader is very tolerant and followers are free to do whatever they want. They come to work and leave whenever they like. Under such leadership, there may be no definite code, regulations, no hierarchy of

authority and no way of determining whether some are wrong or right. This may culminate in the leader not having sufficient control over the staff.

Transactional Leadership Style

The transactional leadership style appreciates the need to achieve organizational goals, but at the same time makes sure that individual members' needs are not ignored as they strive towards institutional goals. In this type of leadership, the leader and workers before getting the job will agree to obey their leader. In this case, the leader has a right to punish or discipline group members if their actions do not meet appropriate standards.

Service in Leadership (Servant Leadership) Concept

In spite of the seven leadership styles highlighted in this paper, there is yet another emerging one which is servant leadership style. Servant leadership is a concept which is based on the philosophy of service in leadership. It is a term coined by Robert K. Greenleaf to define a leader whose interest is first to serve. It starts with the natural feeling that one wants to serve first and then this brings the conscious effort to aspire to lead.

It is a powerful force that occurs when a person discovers the urge in one's heart to serve, answers the call to lead and summons the courage to engage in leadership. It is an attitude that focuses on the task at hand and also on position. Service leaders feel it is important to give back all they can to the community.

Even though there are several models of leadership, it is only servant leadership that stands out as a model of leadership with the main distinction that the one who is called a servant leader does not step forward with the intention to lead but with the innate intention to serve Greenleaf (1977).

It is important because it is about understanding what it means to put the interest of others first. It involves the leader not having to worry about their own problems when there is need to see to the welfare of others. It involves having the understanding to put other people's interest before the leader's personal interest.

It is important because it involves being exemplary, in which case the leader sets a good example for those under him as subordinates and the led. Such people are looked up to by their team members and so must exhibit the right traits that will put both themselves and the led in the right pedestal to evoke people's trust.

A servant leader must be knowledgeable about serving—know how to serve. It is said that the true leader serves: serves people, serves their best interest and in doing so, may not always be popular, may not always impress, but because they are guided by the love to serve others rather than their personal glory, are willing to pay the

price. There are also guiding principles for leaders. Thus, the principles of leadership include but are not limited to the following:

Leadership must be legitimate and authoritative.

This implies that no individual can lead unless given an authority by those being led. The authority is direct and control should be given to him or her. Leadership must subject itself to the demand of public development, responsibility and accountability. It is only within the above framework that good relations can be maintained between leaders and the led.

Leadership must operate within limitations of the mandate entrusted to it by the people. Outside of the people's mandates, the leader ceases to lead legitimately, and in the case of recruitment, leadership must be by merit and not by inheritance or usurpation.

Judging from the highlights of leadership types and principles, it could be asserted that a mix of the leadership types have been adopted in Nigeria, including autocratic, democratic and bureaucratic forms. It is obvious also that leadership in Nigeria has been deficient as they have failed to follow the guiding principles. In terms of legitimacy, most times elections have been rigged and results are not true representation of the votes of the electorate.

It becomes imperative therefore to adjust the leadership system in the country and adopt the most desirable that is capable of launching Nigeria in the path of development and lack of corruption among others. Thus, servant leadership style which emphasizes service in leadership and in which the interest of others is the focal point of the leader who also has the urge to serve and remain exemplary becomes imperative.

This therefore makes pertinent the need to re-orientate all Nigerians, including leaders and potential ones, through education starting from very low level such as primary education level to impart in children who will eventually grow up to become leaders in one capacity or the other, the need to adopt servant leadership style. Leaders at various levels so far should also go through such re-orientation through trainings and seminars to enable them understand their calling and make the required contributions to nation building.

Desirable Characteristics of the Servant Leader in Action

Many writers and scholars have written and researched about servant leadership which is fast becoming an emerging phenomenon (Covey, 2002; Nelson, 2003). However, Larry Spears discovered after exhaustive study of Robert Greenleaf's research and writings that there are in fact ten main characteristics or attributes of the servant leader. These traits, we argue are in current demand in Nigeria.

Listening: Servant leaders are receptive listeners. They almost allow their followers or subordinates to do the talking: knowing that talking out depressing issues could be a therapy to followers. One leadership skill that is often eulogized communication. In servant leadership, deep passion and commitment to listening is a priority. Leaders in Nigeria appear to lack the listening skill of servant leadership. This is evidenced by regular protests (sometimes violent) made by trade unions and even youths in Nigeria in order to get their leaders to listen to them on burgeoning issues.

Empathy: Mother attribute of a servant leader is the willingness to emphasize with others knowing that people need to be accepted and recognized for their special and unique spirits. There is no basis for rejection on whatever ground, even when their behavour or personal reference is not as expected by the leaders. Spears (1998) argued that "individuals "grow taller when those who lead them emphasize and when they are accepted for what they are, even though their performance may be judge critical in terms of what they are capable of doing.

Healing: Servant leaders have the inner strength to heal themselves and others. They are aware of the wounded within the nation and the consequent need for healing in their broken spirits. His attributes will help in matters concerning complaints of marginalize by some ethnic groups in Nigeria.

Awareness:They are aware of the people's perception and self-awareness in the leadership process. Servant leaders are more concerned and careful with issues involving ethics and values in the workplace; they therefore have holistic view of situations and scenarios. As Greenleaf Observed, "awareness is not a giver of Solace - it is just the opposite- it is a disturber and an awakener. Able leaders are usually sharply awake and reasonably disturbed" Spear (2004). Another phrase used for awareness is; "walking your talk" Bennie and Goldsmith (1997). It appears that leaders in Nigeria lack a holistic view of the country.

Persuasion: Although servant leaders are aware that they possess enormous power and authority especially when they are topmost leaders in a hierarchical organizational set- up, they rather employ persuasion rather than positional authority in making decisions within an organization knowing that according to Lord Action, power corrupts, and absolute power corrupts absolutely, Dalberg - Action (1949). Hence, they work with the aim of seeking to convince others (followers or subordinates) rather than demanding compliance through control and coercion.

Conceptualization: Servant- leaders are visionary with ability to see into the future by dreaming big dreams and seeing larger than life visions making them to think beyond day-to-day realities. This is the dividing line between managers and leaders while the former are immersed in the day-to-day routine and doing mechanistic activities, the latter are chanting a way for the glorious future of the organization.

Foresight: Spear (2004) stated that "foresight is a characteristic that enables servant leader to understand the lessons from the past, the realities of the present and the likely consequences of a decision for the future. This is deeply rooted within the intuitive mind of the individuals which largely remains unexplored in leadership research till date.

Stewardship: Servant leaders know they are holding whatever leadership positions they are in based on trust. They also know that trust is earned and can be lost. Peter Blocks 's definition of stewardship, "holding something in trust for another" commitment to the growth of people. Servant- leaders in this case believe have innate values beyond their tangible contributions within the system thus making them deeply committed to the growth of the system and necessary because they are intelligent or clever.

Building Committee

The notion of leaders, subordinates, followers and the society around it is highly needed today in Nigeria. It is this awareness that makes servant leaders to always seek means and methods to instill a sense of community within any system where they are servicing.

Recommendations

This paper suggests the following steps towards policy formations in favour of leadership adoption by leader in Nigeria.

1) leaders should "model the way Kouzer and Posner (2003). This can be done by serving Nigeria better so as to be at a vantage position to advocate servant leadership to their subordinates. There should be value reorientation in favour of the servant leadership concept, just like in the time of "war against indiscipline" in Nigeria.
2) Leader should learn more about and practice the servant leadership style. 3) In furtherance to the point mentioned in 2 above, educational institutions of all levels should be mandated to teach and inculcate the values of servant leadership principles, starting from primary school up to tertiary level. Seminars and conferences can be organized for present leaders in various levels to inculcate the virtues and values of servant leadership.
4) The relevant authority should also follow up on this institutional by choosing inspectors to visit them without notice of ascertain whether the institution is performing as expected or otherwise.
5) Researches should be done in this area to ascertain the most suitable way to re-ordinate the values system of Nigeria. Leaders and potential ones for the adoption of the servant leadership model in all levels of government in Nigeria.

Conclusion

Having analyzed the relevant issues in this topic, it is obvious that Nigeria as a nation is in dire need of leaders where top priority should be service in leadership rather than leading from top to bottom. The servant leadership model is presented here as a possible panacea to the many intractable leadership challenges rocking the delivery of quality leadership towards the political, social and economic development of the country. The paradigm shift calls for the inclusion and the institutionalization of the servant leadership model in all institutions and at all levels of government and people's lives in the country.

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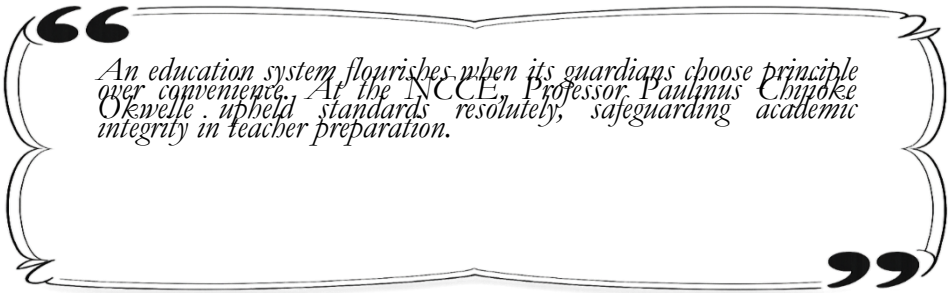
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SECTION THREE

ENCOMIA

Professor Okwelle in the People's Court of Law — where testimonies become legacy.

A Tribute to a Visionary Leader and a True Friend

As I sit down to pen this tribute, I am filled with a mix of emotions of gratitude, admiration, and a deep sense of appreciation for the unwavering support and guidance of our Grand Patron, Women in Colleges of Education (WICE), Nigeria. Your appointment as the Executive Secretary of NCCE was a turning point in the history of WICE. Your passion, dedication, and commitment to the growth and development of our association have been a beacon of hope and inspiration to me. You have been my mentor, my guide, my father, brother and friend. You encouraged me to strive for excellence, to push beyond limits, and to continuously upgrade my professional skills. Your unwavering support has been a constant source of strength, and your wise counsel has helped me to navigate the challenges of my profession and association.

I recall the countless times we have interacted by virtue of my being the Public Relation Officer (PRO) and national secretary of WICE. Sir, I am reminded of your humility, your kindness, and your generosity. You have treated me like a friend, a confidant, and a partner in the growth and development of WICE and our colleges. Your door has always been opened, and your ears have always been attentive to our concerns as well as our aspirations. I am honoured to have had the privilege of working with you, learning from you, and growing with you. You have no idea how much you have impacted on many of us; especially me. Your simplicity, wrapped in unbending principles is one virtue I am striving to possess. I remember a day, in company of my WICE President, Professor Okoli O.Theresa, the Provost of FCE Umunze, as we were sipping tea in your office during a heavy down pour; I was smiling sheepishly until my President had to ask why. My response: "so this is Lilian, sipping tea with NCCE ES and a Provost." You laughed boisterously and said; "PRO, never limit yourself, you are good, the sky is your beginning." You call me "Parot" WICE baptised it to "Positive Parot."

Thank you for your indelible impact on our colleges as a visionary Head. Thank you for the face lift and the many innovations that you brought into the system. Thank you for your unbiased transformational leadership style. In spite of all subtle oppositions and perhaps prejudice of whatever kind, you stayed afloat; doing your best for the commission, our collges, society and humanity. Hmmm! No degree of accolades is good enough for me to describe you or your tenure as the Executive Secretary of NCCE, as WICE Grand Patron, as a father and friend. I am proud to call you my mentor, my role model, and my leader. Thank you for believing in me.

As your tenure comes to an end, and as you move on to the next phase of your life, I pray that God will continue to bless you, your family, and your endeavours. May your legacy continue to live on, inspire and propel us and many that have associated with you during these years to strive for the best. My earnest desire is to see you exalted to a greater seat. Thus, may God reward your success story with elevation that will announce you to the world in a different dimension. May God continue to direct your course and bless everything that concerns you in Jesus Christ name. You are celebrated and cherished. I will miss you. Soar like an EAGLE!

Lilian Elakeche Ochekliye-Onyemachi (Ph.D)
Federal College of Education, Kano.
(now Yusuf Maitama Sule Federal University of Education, Kano).

(Executive Secretary, National Commission for Colleges of Education – NCCE)

Professor Paulinus Chijioke Okwelle stands as a towering figure in Nigerian education, whose life and career exemplify scholarship, visionary leadership, and unwavering commitment to national and human capacity development. This Festschrift is a fitting honour for a man whose intellectual depth and administrative acumen have left an indelible mark on teacher education and technical and vocational education in Nigeria.

As a distinguished academic, Professor Okwelle has consistently demonstrated excellence in teaching, research, and mentorship. His scholarly contributions have enriched the fields of technical education, workforce development, and educational policy, providing evidence-based insights that continue to shape discourse and practice. He has nurtured generations of students and young academics, many including me of whom today occupy strategic positions within academia, industry, and public service is a clear testimony to his enduring influence as a mentor and role model.

In his role as Executive Secretary of the National Commission for Colleges of Education (NCCE), Professor Okwelle's leadership has been transformative. He has championed quality assurance, curriculum innovation, and institutional capacity building across Nigeria's colleges of education. Under his stewardship, the Commission has advanced reforms aimed at aligning teacher education with national priorities, global best practices, and the demands of the Fourth Industrial Revolution. His emphasis on professionalism, accountability, and continuous improvement has strengthened the credibility and relevance of the NCE programme as the bedrock of basic education in Nigeria.

Beyond policy and administration, Professor P. C. Okwelle is widely respected for his integrity, humility, and people-centred leadership style. He combines firmness of purpose with empathy, fostering collaboration among stakeholders while maintaining a clear focus on standards and outcomes. His ability to bridge scholarship and service reflects a rare blend of intellectual rigor and practical wisdom.

This Festschrift celebrates not only Professor Okwelle's remarkable achievements but also the values he embodies—excellence, service, and dedication to the common good. His contributions will continue to inspire current and future generations committed to building a robust, inclusive, and forward-looking education system in Nigeria.

I therefore honour Professor Paulinus Chijioke Okwelle for a life of impact, and celebrate his enduring legacy in Nigerian education.

WORDU, Chiduhiegem C. R., Ph.D

Senior Lecturer, Department of Technical Education,
Ignatius Ajuru University of Education, Port Harcourt;
Rivers State, Nigeria
(Mentee)

Professor Paulinus Chijioke Okwelle Legacy

As God called Moses to lead the Israelites in Egypt from slavery to the promise land Canaan, so is Professor Paulinus Chijioke Okwelle sent to National Commission for Colleges of Education (NCCE) to do the near impossible: Dual mandate for the Colleges and sixty-five years retirement age for the Commission, without any personal benefit attached to him rather personal loss. His two tenors, four years times two, that is eight years was cut down to five years single tenure. This is in order to better education in Nigeria. He gave his assent to go ahead. Kudos to the able achiever.

He has the interest of staff at heart, he takes time to go through the liabilities every time there is money to pay and will ask Finance to pay from the oldest indebtedness to the present if the money cannot pay all. The welfare of the staff is of paramount importance to him going extra mile to make the staff happy. He has left an indelible mark on the sand of history in NCCE. God bless you Professor.

Ukoh. I. Ukoh
Director Finance and Accounts

A tribute to my Lecturer, Mentor, and Benefactor, Professor Paulinus Chijoke Okwelle. Executive Secretary, NCCE Abuja

It is with deep admiration, respect, and heartfelt appreciation that I write this for **Professor P. C. Okwelle**, whose life and work have left an indelible mark on my academic journey and personal development from my school days till present. His influence has been consistent, transformative, and enduring, shaping not only my intellectual growth but also my character, values, and sense of purpose.

My encounter with Professor P.C Okwelle as a student revealed a scholar of uncommon depth, discipline, and passion for knowledge. As a lecturer, he distinguished himself through clarity of thought, scholarly rigor, and an exceptional ability to make complex ideas accessible and meaningful.

Beyond the lecture hall, Professor P.C Okwelle emerged as a mentor of rare dedication. He took a personal interest in my academic progress and professional aspirations, offering guidance that was timely, thoughtful, and deeply impactful. At critical moments in my academic journey, his counsel provided direction, confidence, and reassurance. His mentorship extended beyond academics, instilling in me values of integrity, perseverance, humility, and service. He taught by example, demonstrating that true scholarship is inseparable from character and compassion.

As the years progressed, Professor Okwelle's role in my life evolved into that of a benefactor. His generosity—expressed through opportunities, support, encouragement, and selfless interventions—significantly influenced my growth and advancement. He consistently used his knowledge, position, and influence to uplift others, particularly those willing to learn, work hard, and uphold ethical standards. His benevolence was never self-serving; it flowed from a sincere commitment to human capacity development and the advancement of education.

From my school days till date, Professor P. C. Okwelle has remained a steady pillar of support, inspiration, and guidance. His life reflects a harmonious blend of academic excellence, mentorship, and humanitarian service. He represents the ideal of a true educator—one whose legacy is not measured solely by titles or publications, but by the countless lives he has shaped and empowered.

In honoring Professor P. C. Okwelle, I celebrate a scholar, a mentor, and a benefactor whose impact on my life will forever remain a source of gratitude and inspiration. I am deeply thankful for the privilege of learning under his tutelage and benefiting from his wisdom and generosity. His life stands as a testament to the enduring power of education, mentorship, and selfless service.

Miss Ziganubari Kpegebor
Department of Agricultural Education,
Federal College of Education, Technical Ekiadolor, Edo State.

A tribute to Prof. Okwelle: An Embodiment of Knowledge, Excellence, Honesty, Humility, Leadership and Progress

UNIVERSITY OF NIGERIA, NSUKKA, NIGERIA

Let your light so shine...

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Professor Paulinus Chijioke Okwelle hails from Rumuoro-Ogbakiri in Emohua Local Government Area of Rivers State, Nigeria. I have known him for over 20 years, being that I was his Supervisor during his Master's Degree programme at the University of Nigeria, Nsukka. He holds a Bachelor of Science in Technical Education (Electrical/Electronics option) from Rivers State University of Science & Technology (now, Rivers State University); a Master's Degree in Industrial Technical Education from the University of Nigeria, Nsukka; a Postgraduate Diploma in Electrical Engineering from Rivers State University and a Doctor of Philosophy (Ph.D.) in Technical Education from Nnamdi Azikiwe University, Awka, Anambra State. He is a Certified Teacher, registered with the Teachers Registration Council of Nigeria (TRCN).

Professor Okwelle began his teaching career as a Graduate Assistant at Rivers State College of Education (now Ignatius Ajuru University of Education). He later lectured at the Federal Colleges of Education (Technical) in Bichi, Kano State and Asaba, Delta State, respectively. He also worked as an Electronic Measurement Specialist with Geoservices Nigeria Limited, an international oil and gas industry company, before returning to academia and becoming a Professor of Industrial Technology Education at Rivers State University in 2018. There is no gainsaying that Professor Okwelle is an embodiment of knowledge in Vocational and Technical Education

He has held various leadership positions at the University level, including being Faculty Coordinator of Postgraduate Studies; Head of the Departments of Science and Technical Education and of Vocational and Technology Education. He was once the Director of the Institute of Education at Rivers State University, Port Harcourt. He has also served as an External Examiner for many institutions and was an Adjunct Professor at Federal University Otuoke, Bayelsa State, from 2019 to 2021.

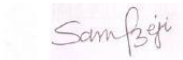
Prof. Okwelle has supervised numerous postgraduate research studies and published over 100 academic papers, in addition to serving on the Editorial Boards of peer-reviewed scholarly Journals and actively participating in several local and

international conferences. He is an active member of several professional bodies and an inductee of the prestigious Nigerian Academy of Education (MNAE); a Fellow of the Association of Business Educators in Nigeria (FABEN) and a Fellow of the Institute of Educational Leadership Practitioners of Nigeria (FIELP). He is an alumnus of the International Visitor Leadership Programme, United States Department of State Bureau of Educational and Cultural Affairs (IVLP), 2024. In all of these positions and publications Prof. Okwelle has exhibited high levels of leadership and intellectual abilities. No wonder that in March 2021, he was appointed Executive Secretary of the National Commission for Colleges of Education (NCCE), overseeing all Colleges of Education in Nigeria.

He has attended several executive leadership and management courses and workshops across the globe, including at Oxford University (City Academy), United Kingdom; Huawei ICT Academy, Shenzhen, China and Columbia Business School, New York, USA. He has participated as a special delegate to the Africa Federation of Teaching Regulatory Authorities' (AFTRA) Teaching and Learning Conferences held in Ghana, Namibia and Angola.

Prof. Okwelle also serves on several critical Councils and Boards in the education sector, including the Tertiary Education Trust Fund (Tetfund), Universal Basic Education Commission (UBEC), Teachers Registration Council of Nigeria (TRCN), Computer Professionals (Registration Council of Nigeria) [CPN], Joint Admission and Matriculation Board (JAMB), and Nigerian Education Loan Fund (NELFUND). All these he has done with a high sense of humility, honesty and integrity, for the progress of the education sector in Nigeria and the wellbeing of humanity in general. In appreciation of his services, he has won several awards in recognition of his contributions to the growth and development of the education sector in Nigeria. Prof Okwelle is a devout Christian, married and has children. Above all, he is my academic Son in who I am well pleased and I feel proud to present him to the world and to pray for his greater future success to the glory of God.

Yours Sincerely,



Sir, Prof. Emeritus Samuel COA Ezeji
MNAE, TRCN, FNVA, FITE

Sir, Prof. Samuel C.O.A. Ezeji KSC, Ph.D (Ihechinyere)