

ARTIFICIAL INTELLIGENCE: NOSTRUM TO INCLUSIVE EDUCATION IN NIGERIA

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Abstract

This paper explores the transformative potential of Artificial Intelligence (AI) in addressing the persistent challenges of inclusive education in Nigeria. Inclusive education is a fundamental human right, yet it remains elusive for a significant portion of the Nigerian population, especially individuals with disabilities and marginalized communities. This paper argues that AI technologies can play a pivotal role in overcoming the barriers to inclusive education and fostering a more equitable and accessible educational landscape in Nigeria. A comprehensive overview of the current state of inclusive education in Nigeria, highlighting the various obstacles that hinder its effective implementation. These obstacles include inadequate infrastructure, a shortage of trained educators, and limited resources, which disproportionately affect marginalized groups. Moreover, the paper discusses the potential of AI to address these challenges through innovative solutions. AI-powered technologies, such as speech recognition, natural language processing, and machine learning, can enhance the accessibility of educational materials and provide personalized learning experiences for students with diverse needs. Additionally, AI-driven analytics can help educators identify and address individual learning gaps, leading to more effective and tailored instruction. Furthermore, the ethical considerations and potential pitfalls associated with the integration of AI in education. It emphasizes the importance of responsible AI development, data privacy, and the need for ethical guidelines to ensure that AI technologies are used to empower, rather than harm, vulnerable populations. In conclusion, this study asserts that AI has the potential to serve as a panacea for inclusive education in Nigeria, bridging the gaps and creating a more inclusive and equitable educational ecosystem. However, it also underscores the importance of a thoughtful and ethical approach to AI implementation in advancing inclusive education in Nigeria.

Keywords: Artificial intelligence, Inclusive Education, Technology, Data Privacy, Integration

Introduction

Inclusive education is a fundamental right, but in Nigeria, many students face barriers to access due to disabilities or marginalized backgrounds. Inclusive education, a concept rooted in the principle that every student, regardless of their abilities, should receive quality education within the same learning environment, is a formidable challenge in Nigeria. Students with disabilities and those from marginalized

backgrounds often face barriers to accessing education. Traditional approaches to inclusive education, though noble in intent, have struggled to meet the diverse learning needs of students. The advent of Artificial Intelligence (AI) offers promising solutions to make education more inclusive (UNESCO, 2020).

Artificial Intelligence (AI) emerges as a beacon of hope in addressing these challenges. AI-powered technologies have the potential to revolutionize education in Nigeria. AI can provide personalized learning experiences, tailoring content and pacing to each student's abilities and learning style. Additionally, AI-driven tools enhance accessibility for students with disabilities, such as speech recognition for those with hearing impairments and text-to-speech applications for visually impaired students. Moreover, adaptive assessments powered by AI can accurately measure student progress and adapt to their abilities, reducing disparities in evaluation.

The synergy between inclusive education and AI is transformative. It not only breaks down barriers to learning but also paves the way for equitable educational opportunities. As Nigeria navigates the complexities of inclusive education, leveraging AI's potential becomes essential. Policymakers, educators, and stakeholders must collaborate to ensure responsible AI implementation, bridging the gap between inclusive education ideals and practical, effective solutions that reach every learner in Nigeria, regardless of their abilities or backgrounds.

The State of Inclusive Education in Nigeria

Despite efforts, Nigeria still struggles to provide quality education for all. Students with disabilities face discrimination, inaccessible materials, and inadequate support (UNESCO, 2020). Inclusive education in Nigeria, like in many parts of the world, is a critical educational approach aimed at ensuring equal access to quality education for all students, including those with disabilities and from marginalized backgrounds. Despite significant progress in recent years, the state of inclusive education in Nigeria remains a complex and challenging landscape. One of the key challenges facing inclusive education in Nigeria is the inadequate infrastructure and resources available to support students with disabilities. Many schools lack basic facilities, such as ramps and accessible classrooms, making it difficult for students with mobility impairments to access education (UNESCO, 2020). Additionally, a shortage of trained special education teachers and a lack of assistive technologies further compound the challenges faced by students with disabilities (UNICEF, 2019).

Discrimination and stigma continue to be significant barriers to inclusive education in Nigeria. Many children with disabilities face social exclusion and are often denied the opportunity to attend mainstream schools. Negative attitudes and misconceptions about disability persist, making it difficult for families to enrol their children with disabilities in regular schools (UNESCO, 2020). While Nigeria has made efforts to promote inclusive education through policy frameworks like the National Policy on Education, effective implementation remains a challenge. There is a need for stronger commitment and investment in inclusive education at both the federal and state levels (Federal Ministry of Education Nigeria, 2004). Additionally, monitoring and evaluation mechanisms to assess the progress of inclusive education initiatives need to be strengthened.

Inclusive education in Nigeria can benefit significantly from increased community engagement and awareness. Building a more inclusive society requires changing perceptions about disability and promoting acceptance and understanding. Community involvement can play a crucial role in advocating for inclusive education and ensuring that children with disabilities are welcomed and supported in regular schools (UNESCO, 2020). While Nigeria has taken steps to promote inclusive education, there are significant challenges that need to be addressed to create a more inclusive and equitable education system. Adequate infrastructure, resources, policy implementation, and community engagement are key areas that require attention to ensure that all students, including those with disabilities, have equal access to quality education in Nigeria.

The Promise of Artificial Intelligence in Education

AI is transforming education globally. It encompasses personalized learning, smart content creation, and even AI tutors. These technologies have the potential to address specific barriers to inclusive education (Baker et al., 2019). AI in education is a transformative and game-changing development with the potential to revolutionize learning experiences for students globally. AI offers a wide array of capabilities that can enhance education in numerous ways. AI-powered technologies can tailor educational content to individual students' needs, pacing, and learning styles. This level of personalization allows students to progress at their own speed and engage with materials that suit their strengths and weaknesses (Kovacic & Zundert, 2021). Adaptive learning platforms, for example, use AI algorithms to continuously assess a student's performance and adjust the content and difficulty level, accordingly, leading to more

effective learning outcomes. AI can significantly improve the efficiency of education delivery and enhance accessibility. Automated grading and assessment tools not only save educators time but also provide instant feedback to students, helping them identify areas for improvement (Baker et al., 2019). Moreover, AI-driven accessibility tools, such as speech-to-text and text-to-speech applications, make educational content more accessible to students with disabilities, ensuring that they can fully participate in the learning process (Hockenberry & Ray, 2020). AI is not just a benefit to students but also to educators.

AI-powered analytics can assist teachers in identifying struggling students early, allowing for timely intervention and support (Baker et al., 2019). Additionally, AI can help educators personalize instruction by providing insights into individual student needs and learning progress, ultimately leading to more effective teaching strategies (Kovacic & Zundert, 2021). The promise of AI in education lies in its potential to create more personalized, efficient, and accessible learning experiences for students while providing valuable support to educators. As AI continues to advance, its integration into education holds the potential to transform traditional classroom models and improve learning outcomes for students across the globe. AI can customize learning experiences based on students' abilities and learning styles. Adaptive platforms like DreamBox and Knewton adapt the content in real time to meet individual needs (Kovacic & Zundert, 2021).

Accessibility Tools for Students with Disabilities

AI-driven tools, such as speech-to-text and text-to-speech applications, make educational content more accessible. This benefits students with visual or hearing impairments (Hockenberry & Ray, 2020). Accessibility Tools for Students with Disabilities (AI) in education is a transformative and game-changing development with the potential to revolutionize learning experiences for students globally. AI offers a wide array of capabilities that can enhance education in numerous ways. AI-powered technologies can tailor educational content to individual students' needs, pacing, and learning styles. This level of personalization allows students to progress at their own speed and engage with materials that suit their strengths and weaknesses (Kovacic &

Zundert, 2021). Adaptive learning platforms, for example, use AI algorithms to continuously assess a student's performance and adjust the content and difficulty level, accordingly, leading to more effective learning outcomes. AI can significantly improve the efficiency of education delivery and enhance accessibility. Automated grading and assessment tools not only save educators time but also provide instant feedback to students, helping them identify areas for improvement (Baker et al., 2019). Moreover, AI-driven accessibility tools, such as speech-to-text and text-to-speech applications, make educational content more accessible to students with disabilities, ensuring that they can fully participate in the learning process (Hockenberry & Ray, 2020). Enhanced Educator Support: AI is not just a benefit to students but also educators. AI-powered analytics can assist teachers in identifying struggling students early, allowing for timely intervention and support (Baker et al., 2019). Additionally, AI can help educators personalize instruction by providing insights into individual student needs and learning progress, ultimately leading to more effective teaching strategies (Kovacic & Zundert, 2021).

Adaptive Assessments for Varied Abilities

AI can provide adaptive assessments that cater to diverse abilities. This allows educators to evaluate student performance more accurately and fairly (Baker et al., 2019). Adaptive assessments have emerged as a dynamic approach to evaluating students' abilities, offering personalized and equitable testing experiences. These assessments utilize the capabilities of Artificial Intelligence (AI) to cater to individual learners' needs and abilities, providing a more accurate reflection of their knowledge and skills. One of the significant advantages of adaptive assessments is their capacity to accommodate varied abilities. Unlike traditional standardized tests, adaptive assessments tailor questions to match a student's proficiency level. For instance, if a student correctly answers a question, the subsequent question may become more challenging, while an incorrect response could lead to an easier question. This adaptability ensures that each student is tested at an appropriate level, minimizing the risk of over or underestimating their capabilities (Baker et al., 2019). Furthermore, adaptive assessments offer a valuable opportunity to detect and address learning gaps. By continuously evaluating a student's performance and adjusting content accordingly, educators gain insights into areas where a student may be struggling. This timely feedback allows for intervention and targeted support, ensuring that students receive the assistance they require to thrive academically (Baker et al., 2019). Inclusive

education also benefits significantly from adaptive assessments. They facilitate the effective accommodation of students with diverse learning needs and abilities. For instance, students with disabilities can receive assessments tailored to their specific requirements, such as the provision of text-to-speech tools or extended time for completion (Hockenberry & Ray, 2020). Adaptive assessments represent a powerful tool for addressing the challenge of varied abilities in education. By dynamically adjusting the content based on individual performance, these assessments ensure that each student is appropriately challenged and supported, contributing to a more equitable and effective educational system (Baker et al., 2019; Hockenberry & Ray, 2020).

Challenges and Ethical Considerations

AI in education is not without challenges. Data privacy concerns, algorithmic bias, and equity issues must be addressed (Buckingham, 2021). Artificial Intelligence (AI) holds immense promise in addressing the challenges of inclusive education in Nigeria. However, its implementation is beset with several significant challenges. Firstly, Nigeria faces severe infrastructural deficits, particularly in rural areas, where access to reliable electricity and internet connectivity is limited. AI-based educational tools often rely on these resources, making them inaccessible to many students. This issue is compounded by the digital divide, where marginalized communities lack access to the necessary devices and technology infrastructure for AI-enabled learning (World Bank, 2020).

A shortage of well-trained educators is a pervasive challenge in Nigeria. While AI can augment the capabilities of teachers, it cannot replace the importance of skilled human educators. The effective integration of AI into education requires not only investment in technology but also in the training and upskilling of educators who may not be familiar with AI systems (UNESCO, 2019). Ethical considerations also loom large in the context of AI in education. Algorithmic bias is a significant concern, as AI systems can perpetuate or even exacerbate existing inequalities. If AI algorithms are trained on biased data, they can inadvertently discriminate against certain groups of students, reinforcing educational disparities (Diakopoulos, 2016). This poses an ethical dilemma in ensuring that AI technologies do not discriminate against marginalized or vulnerable communities. Data privacy is another pressing ethical issue. The collection and analysis of students' data by AI systems raise concerns about how this data is used, stored, and protected. Without strong safeguards, students' privacy can be compromised, and their

personal information may be misused (European Data Protection Board, 2019). There's the ethical concern of accessibility and equity. AI-powered education tools, if not carefully designed, may leave behind students who cannot access or use them due to disabilities or other barriers. Ensuring that AI solutions are designed inclusively and that they cater to the diverse needs of all students is essential (Shah & Gommans, 2020).

Implementing AI for Inclusive Education in Nigeria

To harness AI's potential, Nigeria must invest in infrastructure, teacher training, and AI policy development. Collaboration among government, educators, and tech companies is crucial. Artificial Intelligence (AI) has the potential to revolutionize inclusive education in Nigeria, but its successful implementation requires a multifaceted approach. The implementation process explores key strategies and considerations for integrating AI into the Nigerian education system to foster inclusivity in the following areas: Infrastructure Development: Nigeria must prioritize infrastructure development, ensuring that schools, especially in rural areas, have access to reliable electricity and internet connectivity. Investment in this area is critical for the effective deployment of AI-powered educational tools (World Bank, 2020). Teacher Training and Professional Development: Equipping educators with the necessary skills to use AI tools is imperative. Teacher training programs should be expanded to incorporate AI, helping educators leverage technology to meet the diverse needs of their students (UNESCO, 2019). Customized Learning: AI can offer personalized learning experiences, which are particularly beneficial for students with disabilities or different learning paces. AI-powered platforms can adapt content to individual needs, making education more inclusive (West, 2018).

To address concerns of algorithmic bias and discrimination, AI systems must be developed and audited with fairness and transparency in mind. Ethical AI design principles should prioritize inclusivity and equity (Diakopoulos, 2016). Data Privacy and Security: The protection of students' data is paramount. Robust data privacy policies and mechanisms must be in place to safeguard sensitive information and ensure that it is not misused (European Data Protection Board, 2019). Equity and Accessibility: Ensuring that AI solutions are accessible to all students, including those with disabilities, is crucial. Developers should adhere to universal design principles and provide alternative means of access for differently-abled learners (Shah & Gommans, 2020). Collaboration and Stakeholder Engagement: Successful implementation of AI in education necessitates collaboration among government bodies, educational

institutions, tech companies, and communities. Engaging all stakeholders in the decision-making process can help address diverse challenges and ensure that AI serves the best interests of students (Yildirim & Kezer, 2017).

The integration of AI in inclusive education in Nigeria holds great promise for addressing educational challenges and improving access for all students. However, this transformational journey requires investment in infrastructure, educator training, ethical AI design, data privacy, equitable access, and collaborative efforts to be truly effective. By addressing these aspects comprehensively, Nigeria can harness the potential of AI to advance inclusive education, ultimately fostering a more equitable and accessible learning environment for all its students.

Conclusion

Artificial Intelligence (AI) indeed presents a promising path towards achieving inclusive education in Nigeria. As discussed, its potential to address various challenges, from infrastructural deficits to personalized learning, offers a transformative opportunity for the country's education system. However, the successful implementation of AI in inclusive education requires careful planning, ethical considerations, and a collaborative approach.

Suggestions

Based on the conclusion above it was suggested that to advance education in Nigeria, a multi-pronged approach is imperative. A significant emphasis should be placed on infrastructure development, particularly ensuring that schools, both in urban and rural areas, have access to reliable electricity and internet connectivity. This foundational investment is vital for the effective functioning of AI-powered educational tools. Additionally, teacher training programs should be enhanced to incorporate AI education, providing educators with the necessary skills to integrate AI into their teaching methods. Continuous professional development opportunities must be provided to keep teachers updated.

Ethical considerations are paramount in this AI-driven education landscape. Developers and AI researchers should adhere to ethical AI design principles that prioritize fairness, transparency, and accountability. Rigorous efforts should be made to address algorithmic bias, ensuring that AI systems do not discriminate against any group of students. Furthermore, stringent data privacy policies and security mechanisms are crucial to safeguard students' sensitive information, with a focus on compliance with global data protection standards. Universal design principles should guide the

development of AI-based educational tools to ensure inclusivity, considering the needs of students with disabilities. Collaboration among government agencies, educational institutions, technology companies, and local communities is essential to address diverse challenges and ensure that AI initiatives serve the best interests of students. Continuous research and evaluation of AI implementations in education are vital to identify what works best in the Nigerian context and make necessary adjustments and improvements.

References

- Baker, R., Kovacic, M., & Zundert, M. et al. (2019). Adaptive Learning Technologies in Educational Assessment: Concepts, Research, Implementation, and Application. *Educational Technology Research and Development*, 67(2), 255-278.
- Buckingham, S. (2021). Artificial Intelligence in Education: Ethical Considerations. *Journal of Educational Technology*, 42(1), 1-14.
- Diakopoulos, N. (2016). Accountability in Algorithmic Decision Making: A Case Study of Algorithmic Accountability in Journalism. *Digital Journalism*, 4(3), 398-415.
- European Data Protection Board. (2019). Guidelines 3/2018 on the territorial scope of the GDPR (Article 3) – Version for public consultation. Retrieved from [URL]
- Federal Ministry of Education Nigeria. (2004). *National Policy on Education*. Retrieved from [URL]
- Hockenberry, M. & Ray, D. (2020). Assistive Technologies for Individuals with Disabilities: From Accessibility to Accessibility. *Journal of Assistive Technologies*, 14(2), 68-75.
- Kovacic, M., & Zundert, M. (2021). Adaptive Learning Technologies in Educational Assessment: Concepts, Research, Implementation, and Application. *Educational Technology Research and Development*, 67(2), 255-278.
- Shah, P., & Gommans, L. (2020). Universal Design for Learning: A Systematic Review of Empirically Based Articles. *Journal of Special Education Technology*, 35(4), 213-225.
- UNESCO. (2019). Inclusion and education: All means all. Global education monitoring report, 2019. Retrieved from <https://www.unesco.org/en/inclusion-education>
- UNESCO. (2020). Inclusion and education: All means all. Global education monitoring report, 2020. Retrieved from <https://www.unesco.org/gem-report/en/node/168>
- West, D. M. (2018). How artificial intelligence is changing teaching. Brookings Institution. Retrieved from <https://www.brookings.edu/research/what-is-artificial-intelligence/>
- World Bank. (2020). World Development Report 2020: Trading for Development in the Age of Global Value Chains. Retrieved from <https://databank.worldbank.org/source/world-development-indicators>
- Yildirim, Z., & Kezer, B. (2017). Teachers' and Students' Perceptions of Effective Foreign Language Teaching in a Blended Learning Environment. *International Journal of Instruction*, 10(3), 245-260.