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# ARTIFICIAL INTELLIGENCE IN EDUCATION FOR NATIONAL DEVELOPMENT IN NIGERIA: PROSPECTS AND CHALLENGES

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**Abstract**
*Technology has permeated all aspect of human endeavors. One of the most powerful and recent advancements in technology is the Artificial Intelligence (AI). AI is reshaping all spheres of lives: education, arts, music, language, engineering, medicine and so on. This paper examines the role of AI in education in Nigeria, while noting the prospects and challenges for a smooth integration of the technology in the Nigerian educational space. The paper averred that persuasive use of AI is capable of transforming teaching, learning and evaluation techniques in the educational sector in such a dimension that the untold benefits could ultimately lead to Nigeria's national development.*

**Key Words:** Artificial, Intelligence, Development, Education, challenges, prospects.

## Introduction

Artificial Intelligence (AI) has emerged as a dynamic force capable of reshaping social interactions, particularly in education. AI refers to the development of computer systems capable of performing tasks that typically require human intelligence (Igbokwe, 2023). These tasks include learning, reasoning, problem solving, perception and natural language understanding (Adelana & Akinyemi, 2021). Ogunode (2023) defined Al as programs designed with human-like intelligence and structured in forms of computer, robot, or other machines to aid in provision of any kind of service or tasks to improve social economic and political development of the society. Artificial Intelligence technologies encompass various techniques and approaches, such as machine learning, deep learning, natural language processing, computer vision and robotics. Fullan, et al., (2023) equally stated that Artificial Intelligence can be applied across various disciplines such as health care, finance, transportation, customer service and education. AI has the potential to change ways in which processes are carried out in industries, improve efficiency and create new opportunities (Igbokwe, 2023). Therefore, AI has tremendous influence in the way we do things in modern times. In education, AI applications include intelligent tutoring systems, predictive analytics, and automated administrative tools (Nwoye et al, 2024). Srinivasa, et al (2022) opined that the adoption of AI technologies in education seeks to enhance knowledge acquisition, leading to a surge in online learning. In Nigeria, Artificial intelligence has brought

so many opportunities in areas of Education such as students' activities, lecture note, report and memo writing as well as project writing (Abayomi et al, 2021; Sanusi et al., 2022), security (Falode et al., 2021), Health (Muhammad et al.,2021; Anazodo et al., 2022). Nwoye, et al (2024) submitted that AI systems not only answer questions and solve problems but also devise plans and perform tasks requiring intelligence akin to that of humans. This means that AI can be leveraged in the planning and management of education in Nigeria. Mure?an (2023) noted that AI has revolutionized administrative processes, increasing productivity and capabilities. AI-driven bots can monitor prospective students, facilitate communication between institutions and applicants, guide them in selecting suitable courses, and assist them throughout the enrolment process (Sanusi et al, 2022). Furthermore, AI systems can manage and update student records, including grades and attendance, while also assisting in creating timetables based on available faculty, room slots, and class schedules (Arya, 2024). By automating these tasks, AI reduces the burden on administrative staff, enabling them to focus on more complex matters.

However, several researches pointed out some of the issues that prevent AI from being widely used in Nigeria, including lack of awareness, lack of system or field knowledge, lack of computing resources, and lack of trust in AI as a new tool in education and its management.

**The Applications of Artificial Intelligence in Education**

Artificial Intelligence (AI) has moved from being a futuristic concept to a practical tool reshaping education globally. Ajuwon, Animashaun, and Chiekezie, (2024) discussed AI's applications to cut across teaching, learning, administration, and research, creating new opportunities to enhance quality, access, and efficiency in education systems. Some of the benefits are:

**1) Personalized and Adaptive Learning**

AI systems analyze students' learning styles, pace, and performance to deliver customized lessons. For example: Adaptive platforms adjust the difficulty of exercises in real time based on learners' responses. Recommendation engines may suggest additional resources, practice questions, or videos tailored to individual needs. This ensures that students struggling with a topic receive reinforcement while advanced learners are challenged appropriately.

**2) Intelligent Tutoring Systems (ITS)**

AI-powered tutoring platforms act like digital “private teachers”: Provide step-by-step guidance in mathematics, science, or languages, offer instant feedback and hints, allowing learners to correct mistakes immediately and encourage self-directed learning outside the classroom by giving students 24/7 academic support (Adelana & Akinyemi, 2021).

**3) Automated Grading and Assessment**

AI can grade multiple-choice, fill-in-the-blank, and even short essay questions, saving teachers' time. It enables faster evaluation and timely feedback for students. In large classrooms or online courses (like MOOCs), AI ensures that assessments are scalable and consistent.

**4) Virtual Classrooms and Learning Assistants**

AI chatbots and voice assistants answer student questions, explain difficult concepts, and remind learners about deadlines. Virtual reality (VR) and AI-driven simulations allow students to explore subjects like history, medicine, or engineering in immersive ways. These tools make learning more interactive and engaging, especially for digital-native students (Nwoye, Nwosu, & Okoroji, 2024). **5) Inclusive Education Support**

AI supports learners with special needs by providing assistive technologies such as: Text-to-speech (TTS) for visually impaired students, Speech recognition for learners with writing difficulties, Real-time translation and captioning for language learners or hearing-impaired students. This ensures equal access and participation in learning (Ewa, 2024).

**6) Educational Administration and Management**

AI simplifies school and university management by: Automating admissions, scheduling, and record-keeping, using predictive analytics to identify students at risk of dropping out or underperforming and helping policymakers allocate resources more efficiently based on data insights (Nwoye, Nwosu, & Okoroji, 2024). **7) Research and Curriculum Development**

AI helps educators analyze vast amounts of academic data to identify gaps in learning materials. It can simulate how changes in curriculum affect student performance before implementation. AIdriven research tools assist students and academics in finding relevant literature quickly and detecting plagiarism.

**8) Lifelong and Global Learning**

AI enables online platforms to reach learners beyond traditional classrooms, from primary school children to adult professionals. Through personalized recommendations, learners can continuously upgrade their skills in line with global labor market demands. AI fosters crossborder collaboration by connecting learners and teachers around the world.

**The Benefits of Artificial Intelligence in Education**

Artificial Intelligence (AI) is transforming multiple sectors worldwide, and education is no exception. By leveraging intelligent systems, data-driven tools, and adaptive technologies, Ajuwon, Animashaun, & Chiekezie, (2024) stated that AI offers powerful opportunities to improve teaching, learning, and the management of education systems. For countries like Nigeria and others seeking to expand access, improve quality, and make learning more relevant to the demands of the 21st century, AI provides several important benefits such as: **1) Personalized Learning**

AI can analyze students' performance data and learning patterns to adapt lessons to individual needs. It allows struggling learners to receive targeted support while advanced learners can progress at their own pace. Personalized feedback enhances motivation, reduces dropout risks, and improves long-term retention of knowledge (Ajuwon, et al, 2024)

**2) Enhanced Teaching Support**

AI-powered tools (such as automated grading systems, chatbots, and virtual assistants) save teachers' time on repetitive tasks. Teachers can then focus more on mentoring, critical thinking exercises, and creativity rather than paperwork. AI also offers real-time insights into student performance, helping educators identify learning gaps (Ajuwon, et al, 2024).

**3) Expanded Access to Education**

Through AI-driven platforms, learners in remote or underserved areas can access quality digital lessons and tutoring. Speech recognition and translation tools break down language barriers, enabling cross-border and multilingual learning. For learners with disabilities, AI provides assistive technologies such as text-to-speech, voice recognition, and adaptive interfaces, making education more inclusive (Akinsuroju, Olofin, & Togunloju, 2024).

**4) Data-Driven Decision Making**

AI enables school administrators and policymakers to analyze trends in enrollment, performance, and resource allocation. Predictive analytics can forecast dropout risks, teacher shortages, or areas needing intervention. This leads to more efficient planning, transparent governance and improved education outcomes (Ogunode, 2023).

**5) 24/7 Learning Opportunities**

AI-powered platforms, such as virtual tutors and intelligent chatbots, offer round-the-clock learning support. Students can revise, ask questions, and practice skills outside the traditional classroom schedule. This flexibility is especially beneficial for adult learners, part-time students, or those balancing education with work (Akinsuroju, Olofin, & Togunloju, 2024).

**6) Skill Development for the Future Workforce**

AI tools expose learners to digital literacy, problem-solving, and computational thinking—skills highly demanded in the modern economy. By integrating AI into vocational and higher education, institutions can better align curricula with industry needs, preparing graduates for jobs in science, technology, engineering, and entrepreneurship.

**7) Global Collaboration and Innovation**

AI-driven platforms foster collaborative learning across borders, connecting students and teachers worldwide. Intelligent systems recommend resources, courses, or peer groups that match learners' interests and career goals. This helps build a culture of innovation, creativity, and global citizenship (Culican, 2024).

**8) Cost Efficiency in Education Delivery**

Automation reduces administrative costs and streamlines processes like grading, admissions, and timetabling. Open AI-powered platforms provide affordable access to high-quality educational materials, lowering the burden on students and governments. In the long run, AI can help scale education to millions without proportional increases in cost.

**Challenges of Implementing Artificial Intelligence in Nigerian Educational system**

Despite the promises that AI adoption holds for educational planning and management in secondary schools, some challenges are preventing educational institutions from fully adopting it in their processes and operations. Some of these challenges include:

1. **Data privacy and security concerns:** One significant challenge is ensuring the protection of student information and compliance with regulations such as the Family Educational Rights and Privacy Act (FERPA) in the United States and the General Data Protection Regulation (GDPR) in the European Union. As educational institutions increasingly adopt AI technologies, they must handle vast amounts of sensitive data, including personal and academic information about students (Cummings et al., 2021). This raises concerns about the security of data and the potential for breaches. Data protection regulations require that institutions implement robust security measures to protect against unauthorized access and misuse. Compliance with these regulations necessitates comprehensive data management practices, including encryption, secure storage solutions, and strict access controls to prevent data breaches (Igbokwe, et. al., 2024). AI in education presents considerable ethical dilemmas. A significant worry is the collecting and storage of student data by AI systems, which raises critical difficulties with data privacy. AI can enhance the functionality of learning analytics; nevertheless, these systems require substantial amounts of data, including sensitive information regarding students and educators, which raises significant privacy and data protection issues.
2. **Algorithmic bias:** One critical challenge in AI adoption is algorithmic bias, which occurs when AI systems produce skewed or unfair results due to biased training data. If AI tools are trained on data that reflect existing social inequalities, they may inadvertently reinforce discrimination in student assessments, admissions, and resource allocation. For instance, an AIpowered grading system trained on past academic records may unintentionally disadvantage students from underprivileged backgrounds.
3. **Resistance to change among educators and administrators:** Resistance to change among educators and administrators is another significant challenge in implementing AI and technology. Many educators may be skeptical of new technologies due to concerns about their effectiveness, the potential for increased workload, or fear of being replaced by machines. They may be insufficiently trained in using AI tools in the classroom, hindering their ability to effectively leverage new technology. Educators and administrators may not be familiar with the prompts and commands given to the systems (Arya, 2024).
4. **Infrastructural deficits:** Insufficient access to technology, including Personal Computers (PCs) and tablets, hinders the effective deployment of AI-driven educational tools. The inconsistent supply of electricity and inadequate internet access in numerous schools provide significant obstacles, impeding the effective utilization of AI apps and hampering student's educational advancement.
5. **Issue of inclusion and ease of accessibility:** This is because many individuals do not have equal access to technology which can create a disadvantageous position for such individuals. For example, many students in Nigeria do not have access to a smartphone or internet connection which can put them in a disadvantageous position compared to those who have such facilities. Besides the socio-economic status of students, geographical location can also be a factor in access to AI-based education. This hinders the utilization of AI in educational planning and management of secondary schools in Nigeria (Awofiranye, 2024).
6. **Dehumanizing the learning experience:** A decreased dependence on teachers for instance, is a challenge since AI despite its capacity cannot replace the need for human teachers. The teacher's role is important not only for education but also for shaping the students' careers. Therefore, AI brings a challenge as a decreased dependence on teachers means a decreased focus on students' moral and personality development (Adlawan, 2024).

7. **Inability of students to explore their full potential:** This is because if students start depending too much on AI-based education, it will limit their critical abilities including thinking, logic, and memory which is a big drawback. In other words, students will be depending too much on machines which can hinder their learning and making full use of their potential (Awofiranye, 2024).
8. **Cost factor**: This is another challenge and cannot be ignored. Provision of the initial outlays for software and cloud support is very costly for educational systems. Again, the costs for continuous employee training are expensive. Also, ongoing training of the AI system be costly if organizational processes change. Since there are several technology options, hence it is a difficult decision to restrict the potential options to a few.

**The Way Forward**

It is highly suggested that the Nigerian government should adopt the following into the national policy to enhance effective application of AI in the educational sector for national development:

1. Craft and Implement a Comprehensive National AI Policy. The government should develop an all-encompassing National AI Strategy that provides direction for AI adoption across education, industry, and governance. Such a policy should mandate the integration of AI into curricula from primary to tertiary education, clarify competency requirements, and include infrastructure and funding provisions.
2. Integrate AI and Creativity into Education Curricula. Begin embedding AI literacy, coding, computational thinking, and ethical awareness into education from early schooling through tertiary levels. Equip students with knowledge of algorithms, automation, and digital citizenship to prepare them for a future shaped by AI.
3. Invest in Digital Infrastructure and AI Research Capacity. Allocate sufficient funding for highspeed internet, computing infrastructure, AI labs, and research centers in universities and innovation hubs. Utilize instruments like TETFund (Tertiary Education Trust Fund) for supporting infrastructure enhancements in tertiary institutions.
4. Strengthen Public–Private Partnerships (PPP). Foster collaborations between government agencies, universities, and tech industry players such as Google, Microsoft, and local fintech innovators for: Access to cloud infrastructure and hardware donations, internship and training opportunities and real-world project co-development
5. Expand Skilling Programs and Teacher Development. Scale up initiatives such as 3MTT (Three Million Technical Talent) to train Nigerians in AI, data science, UX/UI design, cybersecurity, and related areas country-wide.
6. Promote Research, Innovation, and Creative Problem-Solving. Establish innovation hubs, AI hackathons, and creative studios within schools and universities to nurture student-led projects and cross-disciplinary collaboration.
7. Ensure Ethics, Data Protection and Responsible AI Governance. Embed ethics, fairness, transparency, and algorithmic accountability within AI policies for both educational and commercial applications. Strengthen and enforce frameworks like NDPR (Nigeria Data Protection Regulation) to safeguard privacy and build public trust.
8. Implement Pilot Projects and Scale Best Practices. Initiate pilot AI classrooms and localized AI education programs in select schools, especially in underserved regions, to test approaches before national rollouts.

**Conclusion**

Artificial intelligence is an innovation that is capable of forcing a dynamic change in the Nigerian educational system. Though persuasive, AI is capable of transforming the teaching, learning and evaluation techniques in the educational sector. Such transformation has implications and is bedeviled by challenges. This paper has made several suggestions aimed at reducing these challenges to enhance the effective deployment of AI in education for Nigeria's national development.

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