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ROLES OF AI IN EDUCATION: INVESTIGATING ITS POTENCY IN TRANSFORMING LEARNING EXPERIENCES AMONG THE NIGERIAN STUDENTS

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ABSTRACT

This study critically examines the roles of artificial intelligence (AI) in education, with a specific focus on its potency in transforming learning experiences among Nigerian students. AI, understood as the capability of computer systems to perform tasks that typically require human intelligence such as learning, reasoning, and decision-making, has emerged as a transformative tool across various sectors, including education. Within the Nigerian educational context, AI-driven technologies—such as machine learning, natural language processing, and intelligent tutoring systems—are increasingly being utilized to enhance personalized learning, improve teaching efficiency, and facilitate data-driven decision-making. The study situates these developments within the broader concept of education as a continuous process that promotes knowledge acquisition, skill development, and societal advancement. It further explores how AI fosters inclusive, accessible, and interactive learning environments through adaptive learning systems and automation. Key roles of AI identified in the study include personalized instruction, automation of administrative tasks, improved student engagement, and the use of predictive analytics to enhance academic performance. While acknowledging challenges such as infrastructural deficits, limited digital literacy, and policy gaps in Nigeria, the study emphasizes that strategic implementation and adequate support systems are essential for maximizing AI's impact. The study concludes that as Nigeria continues to embrace technological advancement, a balanced and strategic approach to AI adoption will be essential to ensure that its benefits are maximized while minimizing potential risks, ultimately fostering a more inclusive, efficient, and future-ready educational system. It also recommends that educational policymakers should develop clear national frameworks and guidelines for the ethical use of AI in education, addressing concerns such as data privacy, security, and algorithmic bias.

KEYWORDS: Artificial Intelligence, Education, Learning Experiences, Nigerian Students

INTRODUCTION

Globally, artificial intelligence (AI) is transforming knowledge delivery, access, and experience, and its impact is becoming more apparent in educational settings. AI offers a viable avenue for innovation in Nigeria, where issues like crammed classrooms, scarce teaching resources, and unequal access to high-quality education still exist. AI has the ability to customize education in ways that are frequently not possible with traditional approaches by enabling intelligent tutoring, automated assessment, and adaptive learning

systems. This shift is not merely technological but transformative, as it redefines the roles of both teachers and students, encouraging a more interactive and learner-centered environment (Holmes, Bialik & Fadel, 2021; UNESCO, 2023).

Beyond customization, AI methods are increasing Nigerian students' access to education by bridging socioeconomic and geographic divides. Chatbots, virtual classrooms, and language processing systems are examples of technologies that can help students in disadvantaged or rural locations by providing real-time support and educational resources without the need for a teacher to be present all the time. This is especially important in Nigeria, where inequalities in educational facilities continue to be a serious problem. Furthermore, AI-driven analytics can help educators identify learning gaps, monitor student progress, and design targeted interventions, thereby improving overall academic performance and retention rates (Luckin, Holmes, Griffiths, & Forcier, 2022; Adebayo & Olanrewaju, 2024).

Notwithstanding these advantages, incorporating AI into the Nigerian educational system also brings up significant issues related to digital literacy, equity, data protection, and infrastructure preparedness. Although artificial intelligence (AI) has the potential to greatly improve educational experiences, its efficacy depends on its strategic application, legislative support, and students' and teachers' openness to adopt new technology. As noted by Adesemowo (2024) the potential of AI is also associated with certain organizational and implementation challenges, especially from the perspective of governance, the availability of resources, and transparency. Thus, it is crucial to look into how AI is changing Nigerian students' educational experiences in order to comprehend both its advantages and potential drawbacks. This study seeks to explore these dynamics, providing insight into how AI can be effectively harnessed to improve educational outcomes in Nigeria (Selwyn, 2022; Federal Ministry of Education Nigeria, 2023).

Concept of AI

Artificial Intelligence (AI) refers to the capability of computer systems to perform tasks that normally require human intelligence such as learning, reasoning, decision-making, and problem-solving. In recent academic literature, AI is conceptualized as a system of algorithms and computational models designed to analyze data, identify patterns, and make autonomous or semi-autonomous decisions in dynamic environments Artificial Intelligence (AI) has emerged as one of the most transformative technologies in the modern business landscape, reshaping traditional approaches to strategy formulation and decision making. According to Amuzat (2025) AI is used to analyze building data, predict the risks of building types and determine whether a city could drop certain inspections. By leveraging AI-driven tools such as machine learning, natural language processing, and predictive analytics, organizations are increasingly able to process vast amounts of data, detect patterns, and generate actionable insights in real time (Luke & Akpan, 2025). With the help of AI, the companies can create some aspect of complex language translation and pattern recognition by disparate independent algorithms in an effort to implement some business globally. (Ayomide O.A et al 2025).

As noted by Mary & Emmanuel (2023).Artificial intelligence is now plainly present in almost every aspect of human civilisation. It has brought about changes and new competitive advantages for a number of institutions and service businesses. Artificial intelligence (AI) has thus far shown to be highly advantageous and helpful in a variety of fields, including banking and finance, marketing, running healthcare systems, and smart apps (such facial recognition, voice recognition, finding assistants, etc.).Ultimately, the effectiveness of AI in achieving thermal comfort in homes is determined by its integration with architectural principles, environmental considerations, and emerging technological advancements. As AI continues to evolve, its

potential to revolutionize building design and enhance thermal comfort in houses remains a promising area of research (Obamoh & Nsikanabasi, 2025). This study will contribute to the ongoing discourse on AI-aided architecture, emphasizing the importance of intelligent design strategies in creating comfortable and energy-efficient homes. Therefore, AI as a concept extends beyond technical functionality to include its implications for governance, innovation, and sustainable development in modern society. Therefore, School management should ensure that they provide comprehensive training programmes for staff and students to understand and utilize AI tools effectively. (Thersa & Akpan, 2024).

Concept of Education

The concept of education refers to a structured and continuous process through which individuals acquire knowledge, skills, values, attitudes, and competencies necessary for personal development and societal participation. Education is fundamentally a method or practice aimed at teaching new skills and principles, thereby sharpening the mind and building moral character in an individual (Sambo et al, 2019). It is a lifelong process that begins at birth and extends throughout life, taking place in both formal institutions such as schools and informal settings like the home and community. Education is not merely the transmission of information; it also involves the cultivation of critical thinking, creativity, ethical reasoning, and social responsibility (Biesta, 2020).

According to Nwachukwu, Ezeji & Ohalete (2023) Education defined as a method or practice that aims at teaching an individual a new skill or new principles. Furthermore, this sharpens the minds and builds moral principles in an individual. Formal, informal, and non-formal forms of education can be generally classified. Formal education is structured, curriculum-based, and taught by qualified professionals in schools and colleges. Informal education occurs naturally through daily experiences, interactions, and observations, while non-formal education includes organized learning activities outside the formal system, such as vocational training and adult literacy programs (UNESCO, 2021). These forms collectively contribute to holistic human development.

Philosophically speaking, education is a tool for both societal advancement and personal development. It develops people's character, sharpens their minds, and equips them to make significant contributions to their communities. According to Noddings (2021), education plays a vital role in fostering moral development, empathy, and responsible citizenship. Education is a vital force behind sustainable development in modern society since it is intimately related to social justice, economic growth, and innovation.

Potency of AI in Transforming Learning Experiences

Artificial Intelligence (AI) has become a transformative force in education, drastically altering educational experiences at all levels. Its power stems from its capacity to increase teaching effectiveness, tailor instruction, and offer data-driven insights that lead to better learning outcomes. Since 2020, the quick development of AI technologies—like machine learning, natural language processing, and intelligent tutoring systems—has sped up the incorporation of digital resources into classrooms, increasing accessibility, adaptability, and interactivity.

Personalized learning is one of AI's most significant contributions to education. In order to customize educational content, AI-powered systems may assess students' learning styles, strengths, and shortcomings. This customized method enhances comprehension and retention by allowing students to learn at their own speed. According to Zawacki-Richter (2020), AI applications such as adaptive learning platforms

and intelligent tutoring systems have demonstrated significant improvements in student engagement and academic performance. Because these technologies offer instant feedback, students can make corrections and improve their comprehension in real time.

By improving instructional design and automating repetitive chores, AI also improves the efficacy of instruction. Teachers can use AI tools to monitor student progress, grade assignments, and produce insights that guide instruction. This lessens the administrative load and frees up teachers to concentrate more on mentoring and critical thinking exercises. Holmes (2021) notes that AI-driven analytics enable educators to identify learning gaps early and implement targeted interventions, thereby improving overall classroom outcomes.

Facilitating inclusive and accessible education is another important area where AI shows great promise. Speech recognition, text-to-speech, and language translation are examples of AI technologies that help learners from different linguistic backgrounds and those with disabilities. These solutions guarantee that learning materials are available to a larger audience and aid in closing educational gaps. According to Bond (2022), AI-supported accessibility tools have significantly improved participation and learning outcomes for students with special educational needs.

Roles of AI in Education

Artificial Intelligence (AI) has significantly transformed the education sector by improving teaching methods, enhancing student learning experiences, and increasing efficiency in educational systems.

- **Personalized Learning**

Personalized learning is one of AI's most significant contributions to education. AI systems examine how students learn in order to customize instructional materials to meet each student's needs. Instead than adhering to a set curriculum, this enables pupils to learn at their own pace. Algorithms are used by adaptive learning platforms to suggest exercises, classes, and other materials based on a learner's skill level. Students benefit from a more successful educational experience as a result. According to Ahmad. (2021), personalized learning improves academic performance and satisfaction by enabling advanced learners to grow more quickly while helping failing students catch up.

- **Intelligent Tutoring Systems**

Through intelligent tutoring systems (ITS), which offer students real-time direction and assistance, artificial intelligence (AI) plays a critical role. Outside of the classroom, these technologies serve as virtual tutors, providing clarifications, answers, and feedback. AI-driven chatbots and tutoring programs guarantee that students can get assistance at any time and from any location, decreasing reliance on instructors (Xu&Ouyang, 2021). In large classrooms where individual attention is scarce, this is advantageous. Additionally, intelligent tutoring systems monitor student progress and modify training to promote independent learning and improved conceptual understanding.

- **Automation of Administrative Tasks**

By automating time-consuming and repetitive administrative chores like scheduling, attendance tracking, and grading, artificial intelligence (AI) benefits instructors. Natural language processing is used by

automated grading systems to assess written and multiple-choice answers, saving teachers a significant amount of time. This frees up teachers to concentrate less on regular paperwork and more on teaching, mentoring, and student participation. AI is also capable of effectively managing student records and producing performance reports. AI increases productivity and facilitates improved decision-making in educational institutions by lowering workload (Zawacki-Richter., 2019).

- **Enhanced Student Engagement and Interaction**

AI makes learning environments more immersive and engaging, which increases student engagement. Learning is made more engaging and dynamic by technologies like AI-driven simulations, gamified learning platforms, and virtual assistants. As explained by Sambo, Sunday & Ekpo (2021) Learning within a Problem based learning curriculum hinges around examples of the ill structure problems that typically occur in real life situation. As noted by Al-Rzoky & Abdulredha (2025), instant feedback from AI systems helps students stay motivated and engaged in their study. Additionally, AI enhances teacher-student contact by providing prompt answers to questions and tailored suggestions, which keeps students engaged in the educational process.

- **Data-Driven Decision Making**

AI analyzes vast amounts of student data to enable data-driven decision making in education. AI analytics can be used by educational institutions to spot patterns, forecast student performance, and identify possible learning challenges early on (Micheni. 2024). This aids educators and administrators in making well-informed choices about student support services, teaching methods, and curriculum design. Additionally, predictive analytics can identify students who are at risk of dropping out, enabling prompt.

Effects of AI on Academic Performance of Learners

Artificial Intelligence (AI) has quickly changed educational settings and has both positive and negative effects on students' academic achievement. Students' access to information, engagement with the material, and demonstration of comprehension have all changed as a result of its incorporation into teaching and learning processes.

Personalized learning is one of the major benefits of AI for academic achievement. Adaptive learning platforms and other AI-powered systems assess students' learning speed, strengths, and shortcomings in order to provide customized content. This customized method improves understanding and memory, which results in better academic performance. According to Zawacki-Richter (2020), AI applications in education support differentiated instruction by providing real-time feedback and customized learning pathways, which significantly boost learner achievement.

Additionally, AI makes educational resources more accessible. Outside of typical classroom settings, learners can receive quick feedback and support through tools like virtual assistants, automatic grading, and intelligent tutoring systems. Holmes (2021) notes that AI-driven tutoring systems can simulate one-on-one instruction, helping students grasp complex concepts more effectively. Additionally, by assisting students with impairments through text-to-speech, speech recognition, and other assistive technologies, AI promotes inclusive education and enhances their academic performance and participation.

AI also promotes engagement and active learning. Interactive tools like chatbots, simulations, and gamified learning environments make learning more interesting and dynamic. These tools encourage active student participation, which is strongly associated with improved academic achievement. A study by Chen.

(2022) found that students using AI-based learning platforms demonstrated higher levels of engagement and improved test scores compared to those in traditional learning environments.

But there are drawbacks to using AI in the classroom that could have a detrimental impact on students' academic achievement. Over-reliance on AI tools is one of the main issues. Students' critical thinking and problem-solving abilities may be diminished if they rely too much on AI for solutions. According to Kasneci (2023), excessive reliance on AI tools like automated writing assistants can hinder the development of independent learning skills and academic integrity.

The digital divide is another problem. Academic achievement varies because not all students have equal access to AI technologies. Furthermore, the physical and academic environment in which a student learns plays a decisive role; school environmental factors have a documented influence on students' academic interest and their achievement in core science subjects (Sambo & Sunday, 2024). When compared to their peers who have access to cutting-edge AI tools, students in underresourced environments may be at a disadvantage. Furthermore, concerns about data privacy and ethical use of AI in education can also impact students' trust and engagement with these technologies (UNESCO, 2021), leading to hesitance in utilizing AI tools that could enhance their learning experience.

Conclusion

In conclusion, the integration of Artificial Intelligence into the Nigerian education system holds significant promise for transforming learning experiences by enhancing personalization, improving access, and supporting data-driven teaching practices. While AI offers innovative solutions to long-standing educational challenges such as limited resources and unequal opportunities, its successful implementation depends on addressing critical issues including infrastructure deficits, digital literacy, and ethical considerations. As Nigeria continues to embrace technological advancement, a balanced and strategic approach to AI adoption will be essential to ensure that its benefits are maximized while minimizing potential risks, ultimately fostering a more inclusive, efficient, and future-ready educational system.

Recommendations

1. The Nigerian government should invest significantly in digital infrastructure, including stable electricity and internet connectivity, to create an enabling environment for effective AI integration in schools, particularly in rural and underserved areas.
2. Educational policymakers should develop clear national frameworks and guidelines for the ethical use of AI in education, addressing concerns such as data privacy, security, and algorithmic bias.
3. Schools and institutions should prioritize continuous training and capacity-building programs for teachers to enhance their digital literacy and ability to effectively utilize AI-powered tools in teaching and learning processes.

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