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CHALLENGES AND OPPORTUNITIES OF ARTIFICIAL INTELLIGENCE INTEGRATION INTO NIGERIAN UNIVERSITY SYSTEM

Akindeyi Luwoye[1], Abiola Tawa Ahmed[2], Olasunkanmi Ibrahim Yusuf[3], Jimoh Akanbi Abdulraheem[4]
[1,2,3,4]Department of Science Education, Al-Hikmah University, Ilorin, Nigeria

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ABSTRACT

The integration of Artificial Intelligence (AI) into education systems worldwide is rapidly transforming traditional learning environments. However, the adaptation of AI technologies in developing countries, such as Nigeria, presents unique challenges and opportunities. This study explores the multifaceted influence of AI on the Nigerian education sector, examining both the barriers to successful implementation and the potential benefits. Challenges identified include inadequate infrastructure, limited internet connectivity, insufficient funding, lack of skilled personnel, and concerns over data privacy and security. Despite these obstacles, AI has the potential to revolutionize Nigerian education through personalized learning, improved administrative efficiency, enhanced content delivery, and data-driven decision-making. Collaboration, skill development, and ethical considerations also emerge as critical factors in maximizing AI's potential in Nigerian higher education. The study concludes that there is necessity for strategic investments in infrastructure, training programs, and a robust regulatory framework to harness AI's benefits while addressing its challenges. The study also concludes with policy recommendations and a roadmap for fostering sustainable AI-driven educational advancements in Nigeria.

Corresponding Author:
Akindeyi Luwoye
Department of Science Education, Al-Hikmah University, Ilorin, Nigeria
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INTRODUCTION

Artificial intelligence has been employed in the field of education as technology became more sophisticated, attracting the interest of education scholars and practitioners. With the advancement of technologies, Artificial Intelligence (AI) has become an integral part of our life. The intelligence exhibited by machines is commonly known as AI, which assists us in our daily life by performing different tasks through speech recognition, language translation, suggesting advanced web search engines (for example, Google Search), understanding human speech (such as Siri and Alexa), self-driving cars (e.g., Waymo), competing at game systems (such as chess and Go), etc . AI is the ability of a

digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. Artificial intelligence leverages computers and machines to mimic the problem solving and decision-making capabilities of the human mind. Alan Turing, often regarded as the "father of computer science" indicated that 'when we are unable to discriminate between a human response or a machine response, it is an example of artificial intelligence'. AI is 'the ability of machines to mimic human intelligence and perform various cognitive tasks like thinking, perceiving, learning, problem solving and decision making'.

AI algorithms for content creation and curation helps educators create and curate educational content, such as generating quiz questions, creating lesson plans and recommending resources. Also, the smart content delivery platforms helps in delivering personalized content to students based on their learning preference, progress and performance. AI Language learning apps utilized speech recognition, matching translation, and adaptive learning algorithms to facilitate language acquisition. Gamification and Learning game are AI technologies that enhance gamified learning experiences, adapting challenges and reward to individual students' abilities and progress.

The potential of AI to revolutionize teaching, learning, and administrative processes is increasingly recognized by educational institutions worldwide. In the Nigerian context, where secondary education faces numerous challenges, the integration of AI offers both hope and complexity. The integration of AI into Nigerian education is part of a broader technological shift sweeping across the country. With the government's initiatives to promote technology and innovation, including the National Policy on Education and the National Information Technology Development Agency (NITDA), Nigerian secondary schools are under pressure to modernize their teaching methods, research practices, and administrative operations. This push for innovation coincides with a growing awareness of the potential of AI to address longstanding challenges in education, such as access, quality, and relevance.

However, the journey towards AI integration into Nigerian education is fraught with obstacles, ranging from infrastructural limitations to skills gaps and regulatory hurdles. Despite these challenges, there are compelling reasons to pursue AI adoption, including the promise of enhancing teaching effectiveness, accelerating research outcomes, and optimizing administrative efficiency. By navigating these challenges and seizing opportunities for collaboration and capacity building, Nigerian secondary school teachers can position themselves at the forefront of AI-driven innovation in secondary education.

METHODS

The Adaptive learning systems comprised of personalized learning experiences based on students' strength, weaknesses and learning pace. Also, the intelligent tutoring systems (ITS) provide personalized instruction, feedback and guidance to students mimicking a human tutor's role. The virtual reality (VR) and augmented reality (AR) AI technologies offer immersive learning experiences, allowing students to interact with educational content in a simulated environment. More so, the Natural language processing (NLP) is used in educational applications for task such as automated essays grading, language learning and personalized feedback. The chatbots and virtual assistants are AI-driven tool that provide students with instant support, answering questions, offering guidance and providing resources. Furthermore, AI-powered data analytics and learning analytics tools analyze data to identify pattern, predict outcomes and

personalized learning for student. AI can analyze vast amount of educational data including student performance. This analysis helps identify area of improvement and inform decision about curriculum amendment.

RESULT AND DISCUSSION

A. AI INTEGRATION INTO NIGERIA EDUCATION SYSTEM

The world is undergoing an unprecedented technological change as a result of the widespread adoption of artificial intelligence (AI) technology. From its emergence in the computer science field, AI has spread across diverse fields (e.g., engineering, business, art, and science), eventually affecting many facets of human life. The application of AI (as observed, for example, in smart home appliances, cloud services, smartphones, Google enhanced smart speakers, and devices equipped with Siri) enhances user experience, improves working efficiency, and increases the convenience of various tasks. For effective functioning in the information era, people must develop AI literacy through the acquisition of new skills, Jennings.

In addition to the application of AI in medical diagnosis, military, logistics or supply chain management, it has originated as an academic discipline since 1956. Since then, AI is applied in education in multifarious ways, that is, tools designed to support the learning and assessment of students, tools to support the teaching of teachers and systems to support the management of educational institutions UNESCO (2021). In identifying the enormous role and prospects of AI in human life, the National Education Policy 2020 (NEP-2020) in India has recommended developing these various important skills in students through the integration of AI in the curriculum. Also, the Central Board of Secondary Education (CBSE) under the guidance of the Ministry of Human Resource Development, India has taken the initiative to make students 'AI Aware' by introducing AI as a subject in the school curriculum. CBSE also supports teacher training for the teaching of AI in schools.

The comprehensive integration of artificial intelligence (AI) into education has proposed more requirements for teaching reform. The gradual deep development and increasing application scenes of AI, could make many scholars to view AI technology as the core means that influences reforms of the teaching method. AI has been extensively used in schools of different levels and categories. Teachers increasingly began to apply AI technology-assisted teaching. As AI technology becomes increasingly mature, artificial intelligence in education (AIED) will realize man–machine interactive systems and real communication functions, which can better promote the improvement of teaching quality, facilitate optimization of learning philosophy and perfection of learning style and encourage teachers to accept AI technology more positively. In particular, AI can help learners change the traditional learning style depending on teachers' teaching and use a self-study oriented learning method. In addition, AI technology helps teachers understand teaching tasks more clearly, teach content accurately, choose teaching keys, and make a scientific assessment of learners' study life.

Surveyed the integration of AI into universities with the application of structured questionnaires on higher education institutes of Udaipur, Rajasthan and accessed its implications on different areas of higher education. Results show that implementing AI in higher education institutes enhances students' learning capacities and AI holds massive prospects for the higher education sector [1]. Panigrahi and Joshi, studied the concept and approach to putting AI into teaching and learning. They have further looked into the

changes and quality of learning AI could bring into education by showcasing some use of AI in the Indian education system. With the study, they concluded that the use of AI in teaching will bring changes to the 'learning experience' by having an adjustable learning environment which could create a 'personalized learning experience'.

B. CHALLENGES OF AI INTEGRATION INTO NIGERIAN EDUCATION SYSTEM

The adoption of AI into Nigerian educations is still in its infancy, primarily due to several factors including limited infrastructure, inadequate funding, and a shortage of skilled professionals. Only a small fraction of Nigerian secondary schools have implemented AI-driven solutions in teaching, research, and administrative processes [2]. The lack of awareness and understanding of AI among teachers, and school administrators can further impedes its adoption.

Nigerian secondary school teachers face significant challenges in terms of infrastructure and resources necessary for implementing AI technologies. This includes access to high-performance computing facilities, data storage systems, and reliable internet connectivity [3]. Pointed out that there is a shortage of skilled professionals with expertise in AI within Nigerian secondary education [4]. This limits the capacity to develop and deploy AI applications for teaching and administrative purposes in secondary schools in Kwara State. Meanwhile, the adoption of AI into Nigerian secondary education raises concerns about ethical implications, including data privacy, algorithmic bias, and job displacement [5]. Addressing these concerns requires the development of ethical guidelines and regulatory frameworks. While progress is being made, several barriers to the widespread adoption of AI into Nigerian education system persist. Limited funding remains a major obstacle, constraining investments in infrastructure, research, and capacity-building initiatives. To address this challenge, universities can explore alternative funding sources such as public-private partnerships, philanthropic grants, and international collaborations [6].

Furthermore, the lack of standardized curricula and accreditation frameworks for AI-related courses hinders the development of structured educational programs. School administrators and teachers can work closely with accrediting bodies and industry stakeholders to design curriculum guidelines that align with industry needs and global best practices. Additionally, integrating AI modules into existing courses across disciplines can ensure that students acquire foundational knowledge in AI regardless of their field of study [7].

Despite the challenges, some Nigerian universities have begun to explore the potential of AI in various domains. For example, the University of Lagos recently launched a research center focused on AI and machine learning applications in healthcare, agriculture, and finance. This initiative aims to foster interdisciplinary collaboration among researchers and industry partners to address societal challenges using AI-driven solutions [8]. Similarly, the African University of Science and Technology (AUST) in Abuja has established partnerships with leading technology companies to train students in AI and data science. Through industry-sponsored projects and internships, students gain practical experience in developing AI applications for real-world problems. These initiatives not only bridge the skills gap but also facilitate technology transfer and knowledge exchange between academia and industry [9].

C. OPPORTUNITIES AI INTEGRATION INTO NIGERIAN EDUCATION SYSTEM

Sustainable Development Goal 4 aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. It emphasises equal learning opportunities for all throughout life. AI technologies are used to ensure equitable and inclusive access to education. It provides marginalised people and communities, people with disabilities, refugees, those out of schools, and those living in isolated communities with access to appropriate learning opportunities. For example, telepresence robotics allows students with special needs to attend schools at home or hospital, or maintain continuity of learning in emergencies or crises. In this way, it is able to support inclusion and ubiquitous access.

AI can help advance collaborative learning. One of the most revolutionary aspects of computer-supported collaborative learning is found in situations where learners are not physically in the same location. It provides students variable choices insofar as when and where they wish to study. In respect to computer-supported collaborative learning, online asynchronous discussion groups play a central role. Based on AI techniques such as machine learning and shallow text processing, AI systems are used to monitor asynchronous discussion groups, thus affording teachers with information about learners' discussions and support for guiding learners' engagement and learning. AI can help personalise learning through various ways. AI can help create a better professional environment for teachers to work more on students with difficulties. Teachers spend plenty of time on routine and administrative tasks such as making assignments and answering frequently asked questions over and over again in school settings. A dual-teacher model entailing a teacher and a virtual teaching assistant, who can take over the teacher's routine task, frees up teachers' time, enabling them to focus on student guidance and one-tone communication. Teachers have already started working together with AI assistants for the best outcomes for their learners.

1. Enhanced Teaching and Learning: AI technologies can personalize learning experiences, provide adaptive feedback, and facilitate interactive learning environments. Integrating AI-driven tools such as intelligent tutoring systems and virtual labs can enhance the quality of education in Nigerian universities [10].
2. Research and Innovation: AI offers opportunities for conducting cutting-edge research in various disciplines, including healthcare, agriculture, and renewable energy. Collaborations between academia, industry, and government can foster innovation ecosystems that leverage AI for solving societal challenges [11].
3. Administrative Efficiency: AI-powered systems can streamline administrative processes such as student admissions, course scheduling, and resource allocation. Automation of routine tasks can free up time for university staff to focus on strategic initiatives [12].

The use of AI can have many implications for almost all stakeholders in the educational process, including both advantages and disadvantages; an important area of its implementation refers to the ethical question. Thus, the focus should be on the protection of human right, the control of AI developments, the responsibility of AI actions, their creators and operators, the digital divide and power relations between teachers, students, and AI technology.

1. Skill Development: The integration of AI in Nigerian universities necessitates the development of relevant skills among students and faculty members. This includes training programs, workshops, and certifications in AI-related disciplines [2].

2. Collaboration and Partnerships: Addressing the challenges and harnessing the opportunities of AI in Nigerian universities requires collaborative efforts between academia, industry, and government. Partnerships can facilitate knowledge exchange, resource sharing, and technology transfer [3].
3. Policy and Regulation: Policymakers need to develop appropriate policies and regulations to govern the ethical use of AI in Nigerian universities. This includes guidelines for data protection, algorithmic transparency, and intellectual property rights [5].

CONCLUSION

Looking ahead, Nigerian universities must prioritize AI education and research to remain competitive in the global knowledge economy, requiring a collective effort from university leadership, faculty members, students, and policymakers. To catalyze AI adoption, several recommendations are proposed: first, investment in infrastructure, where governments and university management should allocate resources for building state-of-the-art AI labs, acquiring cutting-edge computing equipment, and upgrading network infrastructure to support AI research and development; second, capacity building, where universities should offer specialized training programs, workshops, and seminars to equip students and faculty with AI skills, alongside continuous professional development to keep pace with technological advancements; third, industry collaboration, with universities forging strategic partnerships with industry players to co-develop AI solutions, provide experiential learning opportunities, and facilitate technology transfer, while industry advisory boards guide curriculum design and research priorities; and fourth, policy support, where policymakers should create a conducive regulatory environment encouraging innovation while addressing ethical considerations such as data privacy, algorithmic transparency, and accountability, along with formulating national AI strategies to outline long-term goals and investment priorities in AI research and development. By embracing these recommendations and overcoming existing challenges, Nigerian universities can harness AI's transformative power to drive socio-economic development, foster innovation, and empower future AI leaders. Addressing infrastructure constraints, bridging the skills gap, and addressing ethical concerns are essential for realizing AI's full potential in higher education, enhancing teaching, learning, research, innovation, and administrative efficiency.

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