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Leveraging Artificial Intelligence (Ai) for Educational Development in Nigeria: Examining The Challenges and Opportunities

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Abstract: Education establishes a foundation for learning and creativity, serving as a catalyst for social advancement and progress. To enhance education in Nigeria, the government must consistently invest in educational policies, particularly by using the opportunities offered by artificial intelligence (AI) in the teaching and learning processes. This paper examines the challenges and implications of using artificial intelligence (AI) as an educational tool to enhance learning in Nigeria. The study asked the following research question: what problems may arise in the use of artificial intelligence as a pedagogical tool for educational growth in Nigeria? What are the possibilities for the use of AI in educational development in Nigeria? The research used an exploratory approach and gathered data from secondary sources, including textbooks, published papers, internet resources, and newspaper stories. The produced data were organised thematically and examined by content analysis. The connectivism learning theory served as the analytical framework, and the study's findings indicated that AI can customise learning experiences to meet individual students' needs, abilities, and learning styles, while also providing personalised support through real-time feedback and guidance. The report advocates for more investment for the Nigerian education system and emphasises the need to enhance teaching materials and curriculum to render them more creative and scientific. Upon implementation, our educational system will adopt a more scientific approach, yielding competent graduates capable of addressing global challenges.

Citation: Daddie J. A., Iheanyichukwu A. V., Obinna. Leveraging Artificial Intelligence (Ai) for Educational Development in Nigeria: Examining The Challenges and Opportunities. Modern Journal of Social Sciences and Humanities 2025, 4(1), 9-18.

Received: 6th Januari 2025
Revised: 12th Januari 2024
Accepted: 30th Januari 2025
Published: 16th Februari 2025



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Keywords: Technology, Artificial Intelligence (AI), Education, Educational Development

1. Introduction

The importance of education in driving social development makes it an indispensable part of any civilisation. By bringing people together in the quest of knowledge and opportunity and equipping them with the skills and capacities necessary to thrive in the modern world, education serves as a unifying and progressive force for every nation. Education is a powerful tool for national development, according to [1]. It changes the world by imparting knowledge, ideas, talents, and creativity that are necessary for solving global problems. As a cornerstone of any thriving and sustainable society, education plays an essential role in today's world and deserves equal weight with other important societal priorities.

A larger supply of skilled people who can contribute to the development and innovation of the contemporary world is associated with higher labour productivity across

all civilisations, claim [2]. As a result, education is a globally acknowledged critical development indicator due to the indisputable association between it and societal advancement shown over the years. According to the United countries, investing in education is the best way for countries to foster prosperous, healthy, and equitable societies since it is the bedrock of every civilisation. "Everyone has the right to education" [3], according to Article 26 of the 1948 Universal Declaration of Human Rights. In addition to being a fundamental human right, education opens doors to new opportunities and freedoms and helps people develop into their full potential.

Raising the level of education in a society is essential for any culture since it speeds up the process of social progress, which in turn makes globalisation and continuous development possible. The substantial influence of education on social betterment, including economic prosperity, intellectual growth, and lasting peace [4] (Kremer, 2003), makes it an essential development catalyst. The goal of educational development is to improve teaching and learning practices throughout a society's educational systems. A more efficient, inclusive, and successful education system that prepares students for their future endeavours is the goal of educational development. According to Asiegbu et al. (2022)[5], educational development entails societal educational institutions' continuous professional progress and the construction of infrastructure to enable student and stakeholder teaching.

Despite many expansions, the educational system in Nigeria stands to gain even more from the use of artificial intelligence (AI). Algorithm creation, machine learning, deep learning, and natural language processing applications are all part of artificial intelligence (AI), according to [6]. Especially in the field of education, artificial intelligence has the potential to greatly benefit organisations and individuals by increasing efficiency, production, saving time and effort, and overall performance. As a result, it has become a major influence on 21st-century technology. It is clear that UNESCO supports AI in education throughout the world because of their call for countries to employ AI to improve their educational systems. In order to meet the unique needs of each student, [7] note that educational administrators may take use of AI to create individualised lesson plans. Cloud computing and other AI-based tools may help teachers provide course materials to students in a variety of ways to meet their individual needs. Students at Nigerian schools may interact with instructional chatbots made possible by AI, which boosts their understanding and encourages independent study.

A. Statement of the problem

Human capital, technological advancement, and societal and economic well-being are all profoundly affected by the educational system. While many nations are improving their educational systems with the help of tech like artificial intelligence (AI), Nigeria's educational sector is still facing a number of problems that make progress slow and prevent certain schools from offering better instruction. When it comes to improving Nigeria's scientific and technical education, both academics and practitioners have been vocal in their criticisms of the government's policies. An overemphasis on theoretical learning approaches has led to the systematic neglect of technical and scientific education programs in Nigeria, as pointed out by [8]. Academic curricula in Nigeria lack a scientific foundation, which hinders the country's progress in education. Several African academic schools (in Nigeria specifically) have been the subject of criticism from the Open Institute of Technology (OPIT), an online school with EU accreditation, according to [9]. It argued that the gap between what employers need and what schools produce is due to an overemphasis on theoretical knowledge at the expense of practical application. If we want our academic stakeholders to be able to compete on a global scale, we must immediately begin to rethink our national curriculum.

Problems with insecurity also slow down Nigeria's educational system. Kidnappings of both students and teachers have a chilling effect on educational progress in some parts

of the nation [10] wrote for the Punch newspaper about the kidnapping of over 280 students and teachers at LEA Primary School and Government Secondary School in Kuriga, Kaduna State, which sparked widespread outrage throughout the country. When Nigerian educators feel unsafe working here, they leave for greener pastures, lowering our human capital index and contributing to brain drain. The lack of initiatives to educate and develop educators is another barrier to educational progress in Nigeria. Some schools' service quality suffers since their teachers aren't part of their professional development and training programs. The neglect of continuous professional development for educators may be at the root of the current crisis in Nigeria's educational system, according to [11]. Teachers' professional development at all levels of school should be a top priority for Nigeria if the country's educational system is to progress. Educators today face a constantly changing field, and teacher preparation programs strive to provide their students with the knowledge and abilities they'll need to thrive in this environment.

Financial restrictions have a substantial influence on service delivery, which in turn hinders educational growth in Nigeria due to poor facilities and a lack of funding. According to [12], qualified teachers leave Nigeria for countries with stronger funding and support for STEM education because of the country's lack of investment in STEM programs. Within this framework, this study seeks to understand how artificial intelligence (AI) has contributed to educational progress in Nigeria.

B. Research questions

1. What are the possible challenges of adopting artificial intelligence as a pedagogical tool for educational development in Nigeria?
2. What are the prospects of adopting artificial intelligence for educational development in Nigeria?

C. Literature Review

Educational development

In order for societies throughout the world to progress, education is a vital instrument. Investing in research and the technical learning process may help Nigeria enhance its scientific education and, by extension, its national growth. Because of the many ways in which education contributes to a society's progress and development, Kremer argues that funding it is an essential development strategy. As a result, Nigeria's government and other interested parties must embrace and execute new strategies for educational growth.

Educational development is defined in this research as the steady enhancement of a country's educational system via the implementation of laws, instructional facilities, and infrastructures that raise the bar for student achievement. Improving and enhancing the quality of learning through educational policy and planning, curriculum design and reform, teacher training, and the integration of educational technology is one of the main goals of educational development, which also serves as a means of initiating and responding to changes in the learning environment.

Artificial Intelligence (AI)

Because of the many benefits that come with using AI, the idea is slowly but surely finding its way into the realm of education. The use of AI in education opens up new possibilities for personalised learning, rapid feedback, and more efficient evaluation. The ability for computers and other devices to mimic human intellect in areas such as learning, understanding, problem solving, decision making, creativity, and autonomy is known as artificial intelligence (AI), according to Cole and [13]. As well as mimicking and reacting to human speech, gadgets and apps powered by AI can recognise various materials and objects [14] states that artificial intelligence (AI) is a component of technology learning and education management tools that aid in decision-making, instruction, and learning, and offers virtual support for individualised education.

D. Theoretical framework

Connectivism Learning Theory

A theory of learning based on connectivism can only look forward to the future. It is a new school of thought in education that focusses on the specific information a student must have while also taking into account the way people learn in the digital era. Theorists George Siemens and Stephen Downes initially proposed connectivism in 2005 [15],[16] highlighting the significance of technology in education and the rapid expansion of student access to information in the digital era [17]. According to this view, technology plays a significant role in education and that we have opportunity to shape our own learning experiences because to our continual connectivity. Students, according to connectivism, are like "nodes" in a larger network. Anything that has a connection to another thing is considered a node. This includes books, websites, people, technical devices, platforms, and so on. Therefore, according to connectivism, children may learn via non-human instruments like artificial intelligence since learning occurs when there is a connection or "link" between different "nodes" of knowledge.

If Nigeria is serious about improving its educational system, it should take a page out of the digital world's playbook and adapt its teaching methods to the constant flux that characterises the internet. This is according to the connectivism theory of learning. According to [18], connectivist academics tend to prioritise learning new information above reviewing old information. Therefore, connectivism enables students to integrate new information with preexisting conceptual frameworks. By incorporating AI into the Nigerian educational system, both students and teachers would have access to fresh information that may improve their learning while maintaining a theoretical foundation [19]. Artificial intelligence (AI) has the potential to revolutionise education in Nigeria by providing students, teachers, and parents with the tools they need to succeed on a global scale. This is due to the fact that AI enables educators to go beyond a purely theoretical understanding of learning and equip their students with the attitudes, competencies, and preparedness necessary to engage in meaningful conversation with one another, find practical solutions to real-world problems, and generate novel and collaborative ideas, theories, and solutions [20].

2. Materials and Methods

We used an exploratory research strategy in our investigation. This is because, due to the nature of the study's objectives and framework, exploratory research designs tend to make heavy use of qualitative methods of data collecting and include little scientific procedure and rigour. For this study on AI and educational advancement in Nigeria, we also used content analysis to make sense of data collected from secondary sources such newspapers, textbooks, internet resources, and other published pieces. To find out how artificial intelligence (AI) may help improve education in Nigeria, we employed content analysis to look at qualitative data [21].

3. Results

Identifying the possible challenges facing artificial intelligence as a pedagogical tool for educational development in Nigeria

The field of education stands to benefit greatly from the use of artificial intelligence in the years to come. It is impossible to overstate the significance of AI for the improvement of education [22]. There is no question that introducing AI into the classroom represents a sea change, opening up new possibilities for pedagogical innovation and administrative efficacy. Nevertheless, artificial intelligence (AI) adoption is still in its early stages in many developing nations, including Nigeria. This is due to a number of factors, including but not limited to: out-of-date academic curricula, a lack of necessary technical skills,

insufficient funding, uncertainty, ethical concerns, ineffective government policies, user attitude, poor infrastructure, and poor network connectivity [23].

While pedagogical practices and course offerings throughout the globe continue to evolve in response to scientific discoveries, rumours have it that Nigeria's academic programs are more grounded in theory. Digital education and artificial intelligence (AI) are here to stay in Nigeria, according to a professor at the University of Lagos, but the present educational system lacks the tools to promote their widespread use [24]. This is due to the fact that students are not adequately prepared to compete on a global scale within the current framework of Nigerian academic curriculum. According to [25], the heads of Nigeria's educational research agency (NERDC) and national information technology development agency (NITDA) both agreed that the country needs to revamp its educational programs to better prepare its citizens for the digital age and advance its economy.

Concerning the need for Nigeria to adopt a digital strategy for education and learning, Oranu (2010) bemoaned the fact that scientific education continues to confront several obstacles, such as a lack of resources and the necessary expertise in technology. Adequate funding for science-based education is a prerequisite for the use of AI as a pedagogical tool in Nigeria. On top of that, educators nowadays need to know how to use technology effectively in the classroom. This necessitates acquiring the knowledge and abilities necessary for creating, deploying, and using AI systems, both in theory and practice. There is a problem with the delivery of courses since most educators are unprepared and lack the necessary expertise of AI. According to [26], in order for AI to be implementable, training for both teachers and tutors is necessary. This will enable educational administrators to make use of the system, which has the potential to facilitate more adaptable learning and teaching methods and streamline the delivery of services. Because of the potential for limited success and complete acceptance of AI as a teaching and learning tool in Nigeria, it is imperative that individuals acquire the necessary technical skills to keep up with technological advancements.

Concerns about privacy and other ethical issues are another obstacle to the widespread use of AI in the classroom. Instantaneous teacher-student reaction, time savings, and improved learning are some of the well-known advantages of artificial intelligence in education [27]. Most people worry that AI deployment will lead them to lose their employment or at least their current style of functioning since these technologies imitate human intellect. Fear and uncertainty around the adoption of artificial intelligence stem from the fact that our understanding of the technology is still in its early stages in Nigeria and that certain stakeholders have not fully grasped its advantages and benefits. Even while AI offers great promise, it also presents significant ethical challenges to institutions of higher learning, corporations, and governments. Accountability, data bias, transparency, and socio-economic hazards are some of the significant areas that several research have shown as potential AI repercussions on the African social sphere [28]. AI has the potential to introduce bias, uncertainty, and learning imbalance due to its ability to replicate human activities [29]. Reason being, AI system design necessitates the employment of intricate algorithms, which in turn undermine openness and confidence.

While organisations like the Nigerian Educational Research and Development Council (NERDC) and the National Institute for Technology and Development (NITDA) are doing their part to promote science and research-based education in Nigeria, the government isn't doing much to really force schools to abandon theory in favour of empirical evidence. Some examples of government policies include relying too much on outside experts, insufficient financing, and minimal support for industrialisation and innovation. The government's lack of supportive policies for R&D has a cumulative effect on technological progress, according to an article in [30]. When it comes to transforming a

nation's economy, raising living standards, and creating wealth, science and technology are indispensable.

A major obstacle to using AI in Nigerian classrooms is the country's inadequate network infrastructure. Nigeria needs the government to invest in infrastructure and network connection so that students and teachers may use technology in the classroom. Inadequate infrastructure and a lack of affordable networks are important obstacles to artificial intelligence adoption in Africa, according to [31]. As a result, the continent's infrastructure development and mobile technology network connection are moving at a snail's pace. Inadequate learning and educational facilities are a problem in Nigeria, which impacts learning [32] found that science-based learning in Nigeria faces obstacles such as a lack of reliable electricity, outdated technology, and unreliable network connections in their empirical research on E-learning and educational progress in Nigeria: The problems and potential. Potential obstacles to the widespread application of artificial intelligence (AI) in Nigerian classrooms include the aforementioned issues as well as others, such as a lack of a structured data environment and public reactions to new technology (user attitude).

Leveraging artificial intelligence (AI) for educational development in Nigeria

Established in the 1950s, Artificial Intelligence (AI) was once characterised as a new scientific discipline that would systematically investigate the phenomena of "intelligence" [33]. AI focusses on the study and development of intelligent devices. The fast expanding technological area of artificial intelligence has the potential to revolutionise the way people learn, work, and interact with one another. Artificial intelligence fundamentally alters human behaviour, enabling enhanced efficiency and production across many industries, including education [34] points out that one advantage of AI in education is that it may make learning more convenient and flexible. With AI-related infrastructures and methodologies, learners can study whenever and wherever they choose. The ability to understand lessons clearly and at the correct moment is a skill that not everyone has; nevertheless, with the help of AI and its tools, students may study effortlessly and at their own speed. In a judgment-free learning environment, AI systems may offer students strategies to boost their performance. More and more students in Nigeria, regardless of their socioeconomic status or where they live, will have access to high-quality educational materials thanks to the incorporation of AI into the learning pattern. This will increase accessibility while also making learning more adaptable. As a result, this benefit makes it much simpler to provide universal access to education while also personalising the learning process, talents, and styles [35].

Additionally, AI may aid in the creation of educational materials like quizzes, exams, and lesson plans; it can also help with grading, allowing instructors more time for direct student contact. Because AI can assist educators in creating scientific lesson plans that better prepare pupils, its incorporation into the education sector has the potential to increase both service delivery and teacher efficiency in Nigerian schools. Automating assessments is freeing up teachers to focus more on facilitating learning rather than delivering direct instruction [36]. Consequently, educators may complement their teachings with AI resources to help struggling students and provide them real-world experience via human connection.

Tutorials and interactive virtual assistants, powered by AI, may better serve students by responding to their enquiries, expanding on their understanding, and guiding them step-by-step as they study. Thus, AI enhances students' critical thinking abilities via tutorials and virtual support. Inspiring people to think critically and creatively may help them adjust to new situations and careers by coming up with novel ideas.

By making schools in Nigeria more secure, artificial intelligence may help reduce national security threats. Administrators and parents alike may keep tabs on when teachers and students enter and exit the building. Modern AI time tracking has many

advantages, as pointed out by [37]. AI allows organisations to keep tabs on things like staff attendance, task duration documentation, and the use of algorithms to automate project time entries, all of which lead to greater efficiency.

Intelligent tutoring systems that include AI into curriculum creation may assist students adapt to various learning demands, assess their progress more efficiently, and deliver real-time feedback [38]. By removing prejudice and allowing students to freely express themselves and their learning requirements, AI has the potential to greatly enhance educational curriculum in Nigeria. According to [39], using AI-driven chatbots and virtual assistants into school administration has the potential to greatly benefit students by offering quick help and opening up new avenues for their usage in tackling complicated problems. Artificial intelligence (AI) has the potential to enhance educational data analysis, which in turn may affect education policy, school administration, and resource allocation in Nigeria. This is because AI is capable of processing massive datasets. Artificial intelligence (AI) can automatically change material and teaching approaches to enhance individual performance development by collecting and analysing data regarding student/student performance and progress[40].

As an AI tool, ChatGPT provides students with access to a variety of instructional resources and course plans. This is because, by addressing the issue of having too many search engines, it provides students with simple access to online resources in an integrated way. With the help of AI, students may ask questions as they study [41] states that students may benefit from AI-powered chatbots by interacting with them, which improves their learning and helps them understand concepts better, ultimately leading to more independent study [42]. This means that students may build self-assurance in their studying abilities while also competing with their classmates from across the world.

4. Discussion

Everyone agrees that students benefit greatly from feedback that is both objective and provided at the right moment in the context of their learning. Artificial intelligence may also be able to give comments that fit these descriptions. It is already common practice to employ AI to provide students comments on their tests or assignments [42]. To better understand how each kid is doing and to alert teachers when there is a problem, some schools are using AI systems. ChatGPT and Microsoft Bing are two examples of AI technologies that can tailor their comments to each student's work and help them track their progress in school. In light of the aforementioned benefits of AI in the classroom, Nigeria has a great opportunity to advance its educational system by capitalising on AI infrastructures.

5. Conclusion

Once completely implemented and utilised appropriately, AI has tremendous promise for enhancing Nigeria's educational system. Artificial intelligence has the potential to enhance pupils' academic performance and attitude towards learning. As the world continues to become more interconnected, it is prudent for Nigerian educational stakeholders to take advantage of the opportunities presented by AI-based curricula in our schools. The study only scratches the surface of AI's potential in the field, which has far-reaching implications beyond what is currently possible. The use of AI in education opens up new possibilities and advantages, such as the ability to tailor students' learning experiences, get immediate feedback on their progress, and streamline the evaluation process. Consequently, online learning systems may use AI to personalise information and exercises based on each student's requirements and knowledge level.

Recommendations

Leveraging on the benefits of AI for educational development in Nigeria requires a multidimensional approach that involves collaborative and decisive efforts and

commitments from both the government and educational stakeholders. The Nigerian government should make a concerted effort to enhance education via the development of digital policies. The government of Nigeria, via the appropriate authorities, must also ensure that students learn digital skills as part of their required coursework. The country's educational system desperately needs an overhaul to keep up with modern teaching methods. The government should invest heavily in science, research and development through adequate budgetary provisions while utilizing the knowledge of its academics and innovators for development in all spheres. Policymakers, educational stakeholders also have a duty to focus on science-based training and development to ensure that adequate AI skills are acquired for the responsible use of AI in solving both educational and national challenges. Finally, the government should make efforts in building AI infrastructures and networks. For schools to be able to adopt or make effective use of AI tools for teaching and learning, there must be effective technological infrastructures on ground.

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