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INTEGRATING ARTIFICIAL INTELLIGENCE IN TERTIARY EDUCATION SYSTEM AS A PANACEA FOR IMPROVING STUDENTS' ACADEMIC PERFORMANCE IN NIGERIA

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Abstract

Artificial Intelligence (AI) has emerged as a transformative force across various domains, revolutionizing industries and reshaping the way we live and learn. In the realm of education, the integration of AI holds tremendous promise, particularly in the context of improving academic performance of students. This study examined ways of integrating Artificial Intelligence (AI) in tertiary education system as a panacea for improving students' academic performance in Nigeria. The various types of Ai used in education was examined as well as the impact of integrating AI in tertiary education system and the challenges of AI was the focus of this study. The study observed that integrating AI in the education system of tertiary institutions will definitely improve the performance of students. Artificial intelligence (AI) has become a game-changer changing the way teaching and learning happens and concluded that AI unarguably holds the potential to revolutionize teaching and learning in Nigeria by eradicating challenges associated with conventional educational methods. The study suggested that artificial intelligence should be inculcated in the school curriculum in Nigeria. Special trainings should be made for teachers on the use of artificial the intelligence and there should be increase in government funding and infrastructure development.

Keywords: Artificial intelligence, education, integrating, tertiary institution

Introduction

Over the years, traditional classrooms served as the primary arena for students' education, employing uniform teaching methods and consistent teacher guidance. However, the requirement for simultaneous student presence posed challenges in addressing individual learning needs. Education in Nigeria and all over the world has gone beyond teaching and learning within the four walls of the classroom. A child could be educated from his experiences outside the school system. Parents can also impart in their children some basic societal norms, ethics, good conducts inherent in their societies. Education is a social institution through which children are taught basic academic knowledge, skills, and cultural norms as an inseparable part of human life (Nwanguma, & Onyeukwu, 2023). In many areas and education, artificial intelligence (AI) has become a game-changer changing the ways teaching and learning happen. Artificial intelligence is a branch of Computer science that is concerned with the design of intelligent devices that displays features or characteristics related to human intelligence (Robinson, 2021). Artificial intelligence can simply be defined as designing machines to make them behave like humans, i.e., reason and process. They have the power to go as far as spatial processing, language processing and even image processing. It is defined as intelligence exhibited by machines and has many applications in today's society. AI is a programme developed to perform specific tasks that are being utilized for a wide range of activities including medical diagnosis, electronic trading platforms, robot control, and remote sensing. It has

been used to develop and advance numerous fields and industries, including finance, healthcare, education, transportation, and more (Agbola & Idakwoji, 2024).
In the field of education, AI aims to create different forms of educational, psychological, and social learning material. There is substantial evidence that impact of inclusion of AI is positive and the AI based systems that provide tutoring are highly accurate (Mohaghegh, 2020). Artificial intelligence enables educators to create and update content more efficiently and effectively, ensure learning materials are always up to date and relevant. For the students, it helps them to stay informed on latest developments around the world and prepare them for future challenges.

Artificial Intelligence has become a part of our normal lives as we are surrounded by this technology from automatic parking systems, smart sensors for taking spectacular photos, and personal assistance. Similarly, Artificial Intelligence in education is being felt, and the traditional methods are changing drastically. Taking a study from the Chinese they deeply understood their onions, in the world. They are currently the leading AI nation which has a 100% effect on their productivity from education to technology evolution. The academic world is becoming more convenient and personalized due to the numerous applications of AI in education. This has changed the way people learn since educational materials are becoming accessible to all through smart devices and computers (Agbola & Idakwoji, 2024). Today, students don't necessarily need to attend physical classes to study as long as they have computers and internet connection. AI is also allowing the automation of administrative tasks, allowing institutions to minimize the time required to complete difficult tasks so that the educators can spend more time with students. Nigeria as a developing nation, however, will need to improve her educational system by integrating AI into the education system. Efforts to introduce AI-based e-learning models in Nigerian educational institutions primarily revolve around collaborative learning frameworks. The educational goals set by the Seventh National Development Plan and Vision 2020 align with the United Nations' Millennium Development Goals, emphasizing the use of AI technologies in education (Bali *et al.*, 2024). Evaluating the suitability of these platforms in fostering a conducive learning environment for technology personnel is imperative. The integration of AI-enabled learning into the tertiary education system necessitates the education of teacher educators, demanding professional development and support. However, existing workshops and training have proven inadequate. The advent of AI-driven education presents a promising resolution to the constraint posed by restricted physical space within tertiary institutions in Nigeria (Ndzibah and Ofori, 2017).

AI has impacted education, through a teaching and learning process for knowledge and skills acquisition by individuals and groups, with varying degrees of outcomes. To ensure inclusive and equitable quality education whilst promoting lifelong learning opportunities in line with the Sustainable Development Goal 4, AI must be integrated in educational activities in developing countries. It has been argued that AI offers benefits in increasing access to quality education in Nigeria and Africa as a whole, the innovative, evolutionary and revolutionary growth and development of digital technology and ICT in education have instigated the fourth education revolution (Education 4.0) which has a significant effect on learning opportunities, educational policies, and instructional procedures (Eleyyan, 2021). Education 4.0 is evolutionary in nature since newer technologies and education approaches have been replaced by previous technologies and education approaches, AI is a major player of Education 4.0. Integrating artificial intelligence in the academic system would expose an average tertiary institution student to

the opportunities enjoyed by counterparts in other schools all over the world, thus gaining skills relevant for life in this changing world.

Concept of Artificial intelligence

It is important at this point to elucidate on the word 'artificial intelligence'. Nwakunor (2021) defines Artificial intelligence (AI) as the computer controlled robots that think intelligently like human. These robots are controlled electronically with the aid of the computer by mimicking the competencies of the human mind. AI keeps records and analysis of every action being made by the user. As a result of innovation in science and technology, AI is used in all facets of life for human development and comfort. For example, in the educational sector, AI is used to teach children who are at the play group, preparatory and kindergarten classes using robots as teaching aids in the classrooms to impact knowledge on them. According to Nwanguma, and Onyeukwu, (2023), Artificial intelligence (AI) refers to the creation of computer systems capable of performing tasks that historically only human beings could do, such as: reasoning, making decisions, or solving problems. It is also the mechanical stimulation of human intelligence processes especially computer systems. Specific application of AI includes expert systems, natural language processing, speech recognitions, machine visions etc. Generally, artificially intelligent systems can achieve tasks that is universally associated with human reasoning such as interpreting speech, playing games and identifying patterns. They typically learn how to do so by processing massive amounts of data, looking for patterns to model in their own decision-making. Cherian (2020) defines artificial intelligence as the science of making machines do things that would require intelligence if done by humans. Kandula (2020) views artificial intelligence as the development of computer systems that are able to perform tasks that would require human intelligence. Artificial intelligence (AI) refers to computer systems capable of performing complex tasks that historically only a human could do, such as reasoning, making decisions or solving problems. Today the term "AI" describes a wide range of technologies that power many services and goods being used daily. AI is the theory and development of computer systems capable of performing tasks that historically required human intelligence, such as recognizing speech, making decisions and identifying patterns. AI is an umbrella term that encompasses a wide variety of technologies, including machine learning, deep learning and natural language processing (Hussain 2018).

Although AI is commonly used to describe a range of different technologies in use today, many disagree on whether these actually constitute artificial intelligence. Instead some argue that much of the technology used in the real world today actually constitutes highly advanced machine learning that is simply a step towards true artificial intelligence. Despite many philosophical disagreements over whether intelligent machines actually exist, when most people use them. AI refers to a suite of machine learning powered technologies such as CHAT GPT or computer vision that enables machine to perform tasks that previously only humans can do like generating written content, steering a car, or analyzing data. It is referred to as the study of intelligent machines and software that can reason, learn, gather knowledge, communicate, manipulate and perceive objects (Verma, 2018**).** It is a part of computer science that deals with the design of intelligent systems that exhibit characteristics associated with intelligence in human behaviours (Ocana *et al.*, 2019). Similarly, Strusani and Houngbonon (2019) defined AI as a combined large volume of data with computing power to simulate human intellectual abilities such as reasoning, language processing, perception, vision recognition and spatial processing.

Concept of Education

Education is an investment that pays off any time anywhere. Education is the process of teaching, training and learning especially in schools, colleges or any organised setting to improve knowledge and develop skills. Education is defined as the development of all those capacities in the individual which will enable him control his environment and fulfil responsibilities. Education is the function to teach one to think intensively and to think critically. Educational training takes place in Nigeria at Nursery, Primary, Secondary and Tertiary levels. Over the years, Nigeria has experienced continuing crises in education, including limited access to educational opportunities and resources, large class size, poor implementation of planned curriculum, inadequate funding, poor management, lack of interest in endeavour of learning, low number of qualified teachers and low literacy and basic education skills (Onasanya, *et al.,* 2012). Regrettably, illiteracy has come to stay in many developing countries of the world including Nigeria. This in turn leads to poor performance of students in examination and malpractice is inevitable. Effective service delivery in educational training depends on the technique or method used by the teacher in teaching concepts, means of communication, material or media used during the process and nature of learners in the instructional setting. In Nigeria, teachers believe that Artificial Intelligence will be a new driving force for the development of intelligent library and better ideas on information in order to meet up with the current global trends.

Artificial Intelligence in Education

Artificial Intelligence has penetrated and influence growth in education through the invention of educational applications, web searches and several learning platforms with several features they can perform. Below are examples of AI in education categorized under these branches as outlined by Olafare (2023)

Expert system- Educational AI's that function like this include Intelligent Virtual Reality. Examples include:

- ChatGPT- is a chatbot launched by OpenAI, it is built on a GPT-3 which has a large language model, it is also finetuned (an approach to transfer learning) with both supervised and reinforcement learning techniques.
- Teal- is a one place to organize & manage your job search. It's like having your own personal ATS or CRM for the job search
- Calendly- streamline scheduling and eliminate 'back & forth'. It increases the likelihood of getting a meeting booked with someone.
- ResyMatch- match your resume with any job description to increase chances of an interview.

Machine Vision - Examples of AI's that have the capacity to carry out these features include Automated facial recognition and Gradescope.

Natural Language processing- Examples of Educational AI's under this branch include

- Presentation translator- has features that lets you add live subtitles to your presentations in PowerPoint, as you are speaking. Presentation Translator can display subtitles directly on your PowerPoint presentation in any one of more than 60 supported text languages. This feature can also be used for audiences who are deaf or hard of hearing.
- Grammarly- This is an artificial intelligence-based solution that help user with correct grammar usage. Grammarly goes well beyond the standard word processor grammar and spelling checks. Instead of simply flagging glaring errors, Grammarly can also offer style and usage suggestions. It helps users finetune their

writing style to fit into the context to which their writing is targeted. It also helps present idea in a simpler yet communicating.

- Twitter Bot – A twitter bot is a particular kind of software bot that utilizes the Twitter API to manage a twitter account. This software bot is capable of carrying out tasks including tweeting, retweeting, liking, following, unfollowing, and sending direct messages to other accounts on its own. In order to use it properly, you should broadcast useful information, automatically produce engaging or imaginative material, and automatically reply to users' direct messages.
- Speeko – can help user practice interviewing with an AI speech coach. Also helps user get better at public speaking.

Robotics - some educational AI's that performs like robots are Padlet and smartboards.
Machine learning- Educational AI's that function like this include:

- Turn-it-in- is a service for online plagiarism detection offered by the American company Turnitin, LLC, a division of Advance Publications. It was established in 1998 and provides licenses to universities and high schools. These institutions utilize the software as a service (SaaS) website to check submitted works for plagiarism against its database and the content of other websites. Findings can be utilized in formative evaluation to help students evaluate how to avoid plagiarism and enhance their writing, as well as to become aware of similarities with current sources. Moreover, Turnitin, LLC manages the educational website plagiarism.org and provides a similar plagiarism-detection service called authenticate for newspaper editors and book and magazine publishers. The Turnitin suite also includes the online grading and constructive feedback tools GradeMark and PeerMark (student peer-review service).
- Research gate- enables scientists and researchers to share papers, ask and answer questions, and locate partners through social networking.
- Scopus- A comprehensive, highly maintained abstract and citation database, enriched data, and connected scholarly literature from a wide range of fields are all combined in a singular way by Scopus. Scopus locates credible research fast, recognizes experts, and gives users access to trustworthy data, analytics, and analytical tools. With one database and one subscription, you can move your research, teaching, or other priorities forward with confidence.
- Gooru- Gooru is an online "GPS for learning" tool for material exploration, which allows the instructor dashboard includes a number of choices for quickly gauging student progress. Gooru compiles data from many sources and applies AI to calculate traits across various dimensions, including knowledge, mindsets, and talents.
- Web of science- is a platform with paid access that gives users access to numerous databases that contain reference and citation data from academic journals, conference proceedings, and other publications across a range of academic subjects.

Impact of Integrating Artificial Intelligence (AI) in Tertiary Education System

AI has penetrated education spheres, in the form of intelligent books, web browsers, education apps, and learning platforms (Karsenti, 2019). AI has also enabled new ways of learning, teaching, assessment and research thus, increasing the efficiency of educational activities and give access to a wide range of information. Some of the ways AI has impacted education as outlined by Campo *et al.*, 2021 includes

Teaching prospects

AI in education personalizes learning by tailoring experiences to students' needs and styles. It helps teachers create engaging lessons, assess progress, and offer real-time suggestions. AI provides personalized support, and scalable feedback, and simulates student interactions for teacher practice, enhancing classroom dynamics and teaching techniques. It reduces the burden of attending classrooms, marking papers and other tasks, enhancing the overall teaching experience and quality. The use of AI would assist teachers in identifying the learning needs and abilities of individual students and developing appropriate measures to respond to such needs. AI could also provide additional support for teachers in analyzing students' data, predicting their academic achievements and proffering solutions to address their learning challenges.

Learning aspect

AI enables adaptive learning with targeted support, interactive simulations, and virtual reality. It offers personalized tutoring, improving understanding and retention. AI fosters a fear-free environment, encouraging questions, exploration, confidence, and engagement Knowledge structure. AI organizes educational data for easy access and analysis. Knowledge graphs structure information, creating dynamic maps tailored to student needs for relevant content delivery.

Tools and shells

AI tools for education include virtual tutors, smart content recommendations, and automated grading. These technologies personalize learning, provide instant feedback, and adapt to each student's pace and style. AI and education go hand in hand and the new techniques could be all that is required to ensure that all students attain their ultimate academic success. Robots can produce digital content of similar quality as what different essay writing services can create. This technology has already reached a classroom setting. Smart content also includes virtual content like video conferencing, video lectures. AI systems are using traditional syllabuses to create customized textbooks for certain subjects. As a result, textbooks are being digitized, and new learning interfaces are being created to help students of all academic grades and ages.

Personalized Learning

Through AI-powered apps, students get targeted and customized responses from their teachers. Teachers can condense lessons into smart study guides and flashcards. They can also teach students depending on the challenges they face in studying class materials. Unlike in the past, college students can now access a larger window time for interacting with teachers.

Global Learning

Education has no limits, and AI can help to eliminate boundaries. Technology brings drastic transitions by facilitating the learning of any course from anywhere across the globe and at any time. AI-powered education equips students with fundamental IT skills. With more inventions, there will be a wider range of courses available online and with the help of AI, students will be learning from wherever they are.

Interface

AI interfaces in education are user-friendly and intuitive, facilitating seamless interactions between students, teachers, and content. Examples include chatbots, voice assistants, and immersive environments. Tools like Microsoft's Copilot integrate AI to assist with academic tasks, offering real-time support and personalized learning experiences.

New Efficiencies

AI improves IT processes and unleashes new efficiencies. Schools can determine the appropriate methods of preventing students from getting lost in crowds when they run in corridors. AI can also be used in the modelling of complex data to enable the operations department to create data-driven forecasts. This, in turn, allows proper planning for the future, for example assigning seats during school functions or ordering food from local cafeterias. Speaking of which, schools can avoid a lot of wastages caused by over-ordering thereby saving costs.

Simplifying Administrative Tasks

AI can automate the expedition of administrative duties for teachers and academic institutions. Educators spend a lot of time on grading exams, assessing homework, and providing valuable responses to their students. But technology can be used to automate the grading tasks where multiple tests are involved. This will enable teachers would have more time with their students rather than spending long hours grading them. AI can be used to automate or assist administrative work such as admissions and enrolment, and course related tasks like grading and assessment.

Challenges of Artificial Intelligence in Education

Artificial Intelligence (AI) in the Nigerian educational system faces a range of challenges that need to be addressed in order to ensure its effective integration and utilization. Some of these challenges include:

Infrastructure: The availability and quality of infrastructure, such as reliable internet access and electricity as well as availability of computer systems are important prerequisites for implementing AI tools and technologies in education. Nigeria faces infrastructural limitations that can hinder the widespread adoption of AI in the educational system.

Funding and Decline in investment: Adequate financial resources are essential for the development and implementation of AI initiatives. Lack of funding can impede the procurement of necessary hardware, software, and expert personnel needed to deploy AI solutions effectively in Nigerian schools and universities. Also**,** not all business owners or managers are willing to invest in it. The funds required to set up and implement Artificial Intelligence is very high, thus not every business owner or organization in Nigeria can invest in it.

Software malfunction: No technology of human is perfect. A case of software or hardware crash could be highly frustrating to researchers especially in Nigeria where storage and retrieval systems are poor. Hence, software tasks performed by humans can be difficult to trace. This kind of problem can be frustrating and discouraging.

Skills Gap: There is a shortage of professionals with expertise in AI within the Nigerian educational system. The lack of qualified AI trainers, data scientists, and engineers hinders the development and deployment of AI solutions. Bridging the skills gap through targeted training and capacity-building programs is necessary to fully leverage AI in education.

Complex algorithms: The technical side of AI involves some huge data and complex algorithm; sometimes making users not to grasp AI concepts. A lot of researchers in Nigeria are completely unaware of these algorithms and technology, hence finds it difficult to understand the functioning of AI technology. Besides, many Nigerians tend to stay away from some complicated learning.

Content Localization: Many AI-powered education technologies and resources are often developed based on foreign contexts and may not be directly applicable to the Nigerian

educational system. Localizing AI content, including language, cultural references, and examples, is vital for its effective integration into the Nigerian educational landscape.

Resistance to Change: Resistance to change is a common challenge when introducing new technologies like AI. Some educators and administrators may be hesitant to embrace AI due to fear of job displacement or unfamiliarity with the technology. Ensuring proper training, addressing concerns, and showcasing the benefits of AI can help overcome this resistance.

Teacher Training and Readiness: Many educators may lack the necessary training and skills needed to effectively teach using AI tools and technologies. Providing proper training and professional development opportunities to teachers is crucial in order to harness the full potential of AI in enhancing the teaching and learning experience.

Digital Divide: There is a significant digital divide between urban and rural areas, as well as between different socioeconomic groups, in Nigeria. This disparity in access to technology and digital literacy skills creates a barrier to the widespread use of AI in education, leading to unequal opportunities for students across the country.

Conclusion

AI unarguably holds the potential to revolutionize teaching and learning in Nigeria by eradicating challenges associated with conventional educational methods. The integration of AI in teaching and learning has come to stay, and Nigeria will need to integrate AI into the education system to achieve its educational goals, including enhanced knowledge acquisition in the classroom settings and at home. AI is good in instructional delivery at every level as it blends instruction. It is also efficient and effective in instructional delivery. Though there are hitches that seems to show that AI has its own issues in instruction.

Suggestions

Infrastructure Development and Funding: The government needs to invest in improving internet connectivity, providing computer systems, and building digital infrastructure in schools across the country. This will enhance access to AI tools and technologies for students and teachers alike.

Digital Literacy Programs: comprehensive digital literacy programs should be implemented to bridge the digital divide and equip students and teachers with the necessary skills to effectively utilize AI tools. These programs should target both urban and rural areas, ensuring equal opportunities for all.

Teacher Training and Development: training programs and initiatives should be established to equip teachers with the skills and knowledge required to integrate AI into their teaching practices. Continuous professional development opportunities should be provided to keep teachers up to date with the latest advancements in AI.

Integration into Curriculum: there should be collaboration with educational stakeholders to integrate AI-related subjects and skills into the national curriculum. This integration should be accompanied by the development of relevant learning resources and teaching materials.

REFERENCES

Agbola, A. M. & Idakwoji, S. (2024). An Analysis on the role of artificoial intelligence in Nigeria's Education system. *African Journal of Theory and Practice of Educational Research (AJTPER)*11,1-13.

Bali, B, Garba, E. J, Ahmadu, A. S, Takwate, K. T, & Malgwi, Y.M. (2024). Analysis of emerging trends in artifcial intelligence for education in Nigeria. Discover Artificial Intelligence (2024) 4:110 | https://doi.org/10.1007/s44163-024-00163-y.

Campo M, Amandi A, & Biset, J..C. A software architecture perspective about Moodle fexibility for supporting empirical research of teaching theories. Educ Inf Technol. 2021;26(1):817–42.

Cherian, S. (2020). The Role of Artificial Intelligence in the Present Day Education. *International Journal of Engineering and Technology (IRJET)*,07 (06).

Eleyyan, S. (2021). The future of education according to the fourth industrial revolution. *Journal of Educational Technology & Online Learning*, 4(1), 23-30.

Hussain, K. (2018). Artificial Intelligence and its applications goal. *International Research Journal of Engineering and Technology*, 05(01), 838-841. Retrieved from www.irjet.net/.

Kandula, N. (2020). Role of artificial Intelligence in Education. *Alochana Chakra Journal*.

Karsenti, T. (2019). Artificial Intelligence in education: The urgent need to prepare teachers for tomorrow's schools. Formation et profession, 27(1), 112-116. Retrieved on 1st April 2020 from https://ssrn.com/abstract3346658.

Mohaghegh, M. (2020). The Role of Artificial Intelligence in the Future of Education. Interdiscipline Virtual Learn Med Sci. 2020;11(1):65-67.

Nwakunor, J. A. (2021) Leveraging Artificial intelligence to enhance brand management. The Guardian Newspapaer, The Guardian Group. Rutam house, Isolo Lagos. 37 (15)254, 3.

Nwanguma, T.K. & Onyeukwu, H.C. (2023). Integrating Artificial Intelligent in Nigeria Education. A Panacea to Educational Assessment Development in Nigeria. *African Journal of Information, Economics and Management Research*, 1(2),100-10.

Ocaña-Fernández Y, Valenzuela-Fernández L. A, and Garro-Aburto L. (2019) Artificial Intelligence and Its Implications in Higher Education. Journal of Educational Psychology - Propositos y Representaciones. 2019;7(2): 553–568. [Online]. Available:http://search.ebscohost.com.ezproxy. iielearn.ac.za/login.aspx?direct=true&db=eric& AN=EJ1220536&site=eds-live 21.

Olafare F. O. (2023). Artificial intelligence in education: challenges and way forward. *Nigerian Online Journal of Educational Sciences and Technology (NOJEST)*, 5 (1), 1-8

Onasanya, S.A., Ayelaagbe, S. O, & Laleye, A. M. (2012). Mobile phones and adult education in Nigeria: Prospects and future challenges. *New Media and Mass Communuication*, International Institute for Science, Technology and Education.

Robinson, N. R. (2021). Artificial Intelligence: Its Importance, Challenges and Applications in Nigeria. *Direct Research Journal of Engineering and Information Technology*, 5(5), pp 36-41.

Strusani, D., & Houngbonon, G. V. (2019). The role of Artificial Intelligence in supporting development in emerging markets. International Finance Corporation World Bank Group. Retrieved from www.ifc.org/thought.leadership on 10th October 2019

Verma, M. (2018). Artificial intelligence and its scope in different areas with special reference to the field of education. *International Journal of Advanced Educational Research*, 3(1), 05-10. Retrieved from www.educationjournal.org.