



Application of Artificial Intelligence in Education: Challenges and Prospects

Basil C.E. Oguguo¹, Agnes O. Okeke¹, Valentine O. Aneshie-Otakpa¹, Cliff I. Okebanama*¹, Carol Ifeyinwa Okorie² & Victoria D. Efuribe¹

¹Department of Science Education, University of Nigeria, Nsukka

²Department of Computer Science Education, Madonna University, Okija

Corresponding author: cliff.okebanama@unn.edu.ng

Executive Summary

The potential of Artificial Intelligence to improve teaching and learning processes has drawn a lot of attention in education. Because AI has the potential to increase evaluation processes' efficiency, objectivity, and correctness, its implementation in education has drawn attention. AI can be used to enhance grading and student assessment. AI innovation in education has progressed from idealized lab settings to more complicated real-world learning environments. This study looked at the potential benefits and drawbacks of implementing artificial intelligence (AI) in the Nigerian educational system. AI in education has high aspirations, but it also faces many difficulties. Artificial intelligence has a number of obstacles, including a lack of regulatory framework for integrating AI in Nigerian education, infrastructural and skilled labor shortages, issues with privacy and security, and more. It is advised that the government collaborate with pertinent parties to guarantee the implementation of the infrastructure, facilities, and laws required for the efficient and ongoing use of AI in teaching and learning in the current day.

Keywords: Artificial intelligence, Problems and prospect, Education system, Digitalization

Introduction

Technology is gradually permeating all sectors of the economy in every country of the world. The educational sector is not exempted from the various technological strides and development that took place within the twenty-first century. Many technologies used in teaching and assessment such as computer assisted instruction, computer based testing among others have found substantial application in the field of education. Alonsode- Castro and García-Peñalvo (2022) assert that the global advancement of technology has influenced people's ways of living in employment, health, education, and training, and that these effects can be both positive and harmful. However, educationist are still in need of technologies that can enhance teaching-learning processes in a variety of disciplines, helping to promote a more personalized education, to enhance learning, to aid with curricular planning, data management and to enhance student assessment among others especially in higher education. Higher education's future, according to Osetskyi et al. (2019),

is directly related to the advancement and capacity-building of new intelligent machines that can support vast volumes of knowledge, self-learning, and improvement.

However, artificial intelligence is still new in the educational sector. According to Balaram (2021), artificial intelligence is still in its infancy, and only few academic institutions have partnered on the project. This has left a vacuum in the body of knowledge regarding the difficulties and future possibilities of incorporating artificial intelligence into education, particularly in developing nations such as Nigeria. Thus, the purpose of this review was to examine the difficulties associated with implementing artificial intelligence in education.

Artificial Intelligence in Education

The level and quality of education in any nation depends on so many factors. These factors may be internal to education such as quality of teachers and classroom facilities or external such as economic, social



and political factors. Moreover, rapid digitalization in educational institutions can also influence the education system (Cosmulese, et al., 2019). The occurrence of the COVID 19 pandemic resulted to a shift in pedagogy resulting to more of distance learning and less of face-face learning. These demonstrates how crucial digital technologies are in education (Petroye, et al., 2020). Artificial intelligence gain prominence as one of such digital technology to aid teaching, learning and school administration.

Artificial intelligence refers to intelligence exhibited by machines instead of people. Artificial intelligence, according to Verma (2019), is the study of intelligent software and robots that are able to reason, learn, gather information, communicate, operate, and perceive objects. Ahmad et al. (2021) state that artificial intelligence (AI) was first utilized by John McCarthy in 1955 and was described as the ability to make a computer behave in a way that a human would be considered intelligent if it were doing so. According to Ahmad et al., artificial intelligence (AI) describes systems that are capable of carrying out cognitive tasks like learning and problem-solving that are connected to the human mind. It involves a variety of tasks, including as creating artificial intelligence for computers that can recognize speech, learn, plan, and solve problems. These systems are intended to function with different degrees of independence. Therefore, programming machines to think and behave like humans is the definition of artificial intelligence (AI). According to these definitions, artificial intelligence is the ability of computer programs to solve complicated problems in a way that is similar to that of humans.

Silently and gradually, this technology has made its way into classrooms in the guise of personalized, adaptive, or intelligent learning systems. They have a large impact on students' and teachers' lives by collecting and evaluating enormous volumes of big data about kids (Holmes, et al., 2021). In particular, artificial intelligence in education is based on numerous technology advancements that offer learning analytics, suggestions, and diagnostic tools in a variety of formats and contexts (Organization for Economic Co-operation and Development (OECD), 2020). These applications are still in their infancy and are more often employed locally and experimentally than on a system-wide basis. Nonetheless, there are numerous indications that technology may change education in the next years, both within the classroom and throughout the institution. For example, AI is incorporated into a number of educational technologies, including

intelligent tutoring, chatbots (Clark, 2020), and automated grading systems (Heffernan & Heffernan, 2014).

With the aim of ensuring that students pass tests, teachers at many educational institutions are tasked with providing teaching, feedback, and attention to a large number of students in a short amount of time. Since each student has a unique learning style, set of prior knowledge and cognitive abilities, emotional disposition, and learning demands, it can be challenging to do this. Given that AI has the ability to address numerous issues, its influence on education is crucial (Woodie 2018). Thus, the difficulty of advanced individualized learning could be addressed by Artificial Intelligence in Education. Consequently, Chen et al. (2020) clarified that these systems provide several chances for all parties involved in the educational process. But, in spite of its benefits for teaching, artificial intelligence has drawbacks just like any other technology.

Prospects of Artificial Intelligence in Education

There are a lot of opportunities for artificial intelligence in many spheres of life, including education. A few of the potential applications of AI in education are discussed in the section below. The most promising application of artificial intelligence in education is the personalization of instruction and learning resources. Customizing education to meet the individual needs and skills of every student is the aim of customized learning. Artificial intelligence (AI) programs can foresee, recommend, and determine the next steps in the learning process based on data from individual students. They can also identify educational materials and methods that are suited for each individual student's level. Artificial intelligence (AI) tools assist kids in learning at their own pace and provide guidance to teachers on how best to assist them.

Additionally, artificial intelligence (AI) fosters a positive atmosphere by offering a backdrop that is conducive to students' learning preferences and methods. Artificial intelligence, as defined by Jain & Jain (2019), encompasses all electronic learning, processing, and teaching modalities. The straightforward and flexible structure of these AI-influenced environments allows users to tailor their learning to their own requirements. We can therefore draw the conclusion that artificial intelligence (AI) is a well-designed technology that provides a flexible environment, chances for cooperation, options, and control over the learning process, enabling both



teachers and students to pursue learning effectively. In higher education settings, tutors also oversee AI. Teachers can use AI to create a learning environment where students can understand concepts more deeply.

Giving all pupils more equitable access to education is another potential application of AI in education, which has proven difficult for many emerging and impoverished nations. According to the OECD (2020), one of the global goals outlined in SDG Goal 4 is inclusive education. This goal aims to guarantee equal access to all educational levels for all individuals, including those with impairments. Previous studies have shown that AI systems are effective in helping students with disabilities—such as those with visual or hearing impairments or social skills—to benefit from schooling. Wearables with AI capabilities, for example, can help vision impaired kids learn to read books, identify faces, and socialize with others in their community. There are systems in place designed to help children with a range of difficulties. Thanks to robots, augmented and virtual reality (AR/VR), and other AI-powered technology, students with physical or mental health difficulties can study and participate more in class. For example, kids with autism can explore and enhance their social skills in a classroom setting by collaborating and interacting with virtual characters and digital objects (OECD, 2020).

AI has also demonstrated potential for early student disability problem diagnosis. According to Drigas and Rodi-Eleni (2012), AI-based methods have demonstrated promise in the early diagnosis of dyslexia, for instance. One well-known example is the Swedish startup "Lexplore," which created a system that swiftly looks for pupils who might be at danger and uses reader eye movements to identify dyslexia. The business is currently growing into the US and UK and is offering school and school-district wide scanning using the data-based pattern recognition system (Jakobsson, 2017). Furthermore, attention deficit hyperactivity disorder (ADHD) and autistic spectrum disorder have been successfully diagnosed using AI-based methods. Specifically, it appears that child-robot interaction makes new diagnostic and special needs educational applications possible (Scassellati, et al., 2012).

Children's cognitive development has been found to benefit from AI. Drigas and Rodi-Eleni (2012) state that there are three essentially different applications of AI, and that each of these applications may have a different impact on the cognitive development of adults and children. AI can enhance

existing capabilities. According to Tuomi (2018), it is possible to minimize human knowledge, experience, and ability while emphasizing the value of behavioral repertoires. Because of this, acquiring the domain-specific knowledge that was formerly required for professional behaviour is not always necessary for humans. Two advantages of artificial intelligence are a quicker rate of cognitive development and the creation of cognitive talents that are not achievable without technology. The mechanization of human labor has made possible things that would not be imaginable without technology, and the mechanization of cognitive work has made possible new activities that were not before possible (Tuomi, 2018). Certain human cognitive capacities may become less valuable or perhaps outdated as a result of AI. For example, because AI can now convert speech to writing and vice versa, dyslexia may not have the same societal significance as it once did. While persons with dyslexia and dyscalculia might benefit from AI, it may be difficult to predict how technology will impact society as a whole. For example, computers can assist people with adding and multiplying numbers, but if they grow overly reliant on them, it may be more difficult for them to grasp more sophisticated mathematical ideas that need number sense and mental arithmetic.

AI has the ability to help teachers by simplifying their tasks. AI could ease the workload associated with attending classes, marking papers, and other duties, improving the standard and overall quality of teaching. Once more, educators have the ability to create communities. From these networks, mentors and peers may arise, which inevitably improves the caliber and experience of teaching. Teacher-facing AI systems are utilized to support teachers and lessen workload, claim Zawacki-Richter et al. (2019). This is accomplished by automating procedures including management, evaluation, feedback, and plagiarism detection. Additionally, AI might help teachers in other ways, such as by evaluating student data, forecasting academic success, and offering solutions to overcome learning obstacles. AI also gives teachers more understanding of their pupils' progress. According to Risugu (2019), this could assist educators in modifying their methods and meeting the unique demands of each student. Additionally, AI can provide educators with the necessary and sufficient knowledge on the unique qualities of every student that may have an impact on their future job pathways.

In conclusion, new advances in AI could have a big influence on the skills needed and create new



opportunities for education (Tuomi, 2018). AI in education is still in its infancy and is changing rapidly. On the other hand, technological integration might greatly improve education. The use of artificial intelligence (AI) in education has been proposed by Khare et al. (2018), Martiniello et al. (2020), Zawacki-Richert et al. (2019), and others to support a variety of functions, including student self-regulation, motivation, and well-being, as well as individualized learning support and feedback, learning process support, assessment and evaluation, and competence management.

Challenges of AI in Education

Despite these possibilities, the use of AI in education is less advanced than anticipated, in contrast to other fields. Moreover, the technology also has its own challenges especially in developing countries like Nigeria compared to developed countries. Previous researchers have grouped these challenges into three different groups namely: policy, techno-economy and security and related data issues.

One of the major challenges of AI in education in Nigeria is policy framework. There is the need for a broad policy framework on the integration of artificial intelligence in education. Fostering corporate engagement and creating a sustainable environment for the application of AI to education require a complete policy framework, much of which would require revision of present regulations and development of new ones. Delivering on the promise of positive AI, according to Besaw and Filitiz (2019), will necessitate effective governance structures, which are a component of the policy framework. Compared to more developed nations such as Europe, Canada, the U.S., and China, there is no well-documented strategy for AI in Nigeria (Nayebare, 2019). No policy framework can be imported from another that will suit the needs of the nations. Hence, a qualitative policy framework is required to enable the integration of AI in education in Nigeria.

The integration of AI in education requires an environment with well-developed infrastructural facilities and trained experts in AI. However, these facilities appear to be lacking in the Nigerian education sector. According to Buttice (2019), a major issue that has to be addressed by different African governments and the private sector is the region's wildly uneven IT infrastructure. This is true because AI demands incredibly powerful networks, steady connectivity, and vast amounts of processing power.

While there may be some advantages to utilizing AI to profile learners, such as the ability to spot students who may not complete their education (Barrett, et al., 2019; Hager, et al., 2019), the technology can also be overbearing and compromise a learner's legitimate expectation of privacy. Where attendance is linked to state welfare payments, like in Brazil's Bolsa Familia programme, it might also have negative impacts on the family (Canto, 2019). Strategies such as combining social media posts and school records containing personal information for retention purposes are unlikely to meet the requirements of countries that follow the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (ETS No. 108)⁵⁴ regarding data minimization. These techniques also fail to address the argument that children shouldn't be routinely profiled in order to prevent categorizing or ranking them in a way that could be detrimental to their development and future selves.

Other considerations are the importance of interpersonal ties and the inherently human experience of education. To put it another way, AI will not replace instructors. Experts also list bias as an AI drawback, according to Robert (2019). The computer-generated scores will be computed using the outcomes of thousands of exams. Automated scoring is not capable of making these distinctions.

Conclusion

The advent of artificial intelligence has revolutionized the way activities are performed in the world. The impact of AI can be seen in almost all sectors of world affairs ranging from health, economy, marketing, agriculture and education among others. The use of AI in education is here to stay, and Nigeria will probably make use of it to meet its educational objectives, including improved knowledge acquisition in formal learning environments and at home. The technology no doubt holds several important prospects in education. Most of the prospects in education can be seen in areas such as: teaching and learning, grading, aiding students with disabilities and diagnosing disabilities in students. Other prospects include: grading of students and providing feedbacks to teachers and students. Despite the promises of AI in education, the technology faces enormous challenges. Some of the challenges faced by Artificial intelligence borders on a lack of policy framework on the integration of AI in education in Nigeria, lack of infrastructure and skilled manpower and privacy and security problems. It is

recommended that the government in conjunction with relevant stakeholders should work hand in hand to ensure that necessary policies, facilities and infrastructures needed for effective and continuous application of AI in teaching and learning in this modern age be put in place.

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