

Impact of Artificial Intelligence on the Transformation and Development of Educational Sector in Nigeria

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ABSTRACT: The study examined the impact of AI in transforming the educational sector in Nigeria. The many uses of AI technologies in educational measuring and evaluation are examined in this study. Three research questions that transcend to three hypotheses were formulated to act as a guide in realizing the objectives of the study. The research was anchored on technology/diffusion innovation theory. The data for the research were sourced mainly from documented works. The findings of the study revealed that the digital divide is affecting rural dwellers, individuals, groups, and regions with socio-economic or infrastructural limitations. The paper recommended among other things that there is urgent need for the government to close the widening gap of digital divide in the rural areas by installing technological enhancements to drive artificial intelligence in teaching and learning; the teachers should be intermittently trained to be acquainted with the current trend of artificial intelligence tools used to ameliorate the difficulties posed by the new innovation.

Keywords: Artificial intelligence, education, transformation, technology, development

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INTRODUCTION

Revolutions in every area of human growth brought about by the use of information communication and technology have caused ongoing, dynamic changes in the educational system. At this time, school managers and administrators are being driven to keep up with technological progress by computer apps powered by augmented reality (AR), virtual reality (VR), and artificial intelligence (AI) (Kaviyaraj and Uma, 2021). The most effective method for overcoming the difficulties of mastering 21st-century management and administrative abilities has been demonstrated to be John McCarthy's 1956 development of artificial intelligence. McCarthy was a retired professor of computer science at Stanford.

According to Chen et al. (2020), artificial intelligence is stated to have increased the efficacy of management and instruction. This is due to the fact that it offers task responsibility benefits that are reassuringly competitive. Inferentially, artificial intelligence (AI) systems provide efficient assistance for online instruction and learning,

personalizing and energizing the learning process, automating repetitive administrative activities, and adaptive evaluations. Any administrator, professor, or student who does not understand how artificial intelligence is applied will thus be unable to stay up with contemporary technology.

A machine or computer program is said to have artificial intelligence (AI) if it uses aspects of human-like thinking to complete a job. A few examples of artificial intelligence in action are maps and navigation, face recognition, text editors, autocorrect, search and recommendation engines, chatbots, digital assistants, social media, and e-payments (Dalia et al., 2021; Fazlagic and Skikiewicz, 2014). Planning, problem-solving, and rational conduct are further uses. Another application of the word is the attempt to create systems with cognitive abilities that are similar to those of humans, such as the capacity to reason, find meaning, generalize, or learn from experience.

Another trend is the assignment of new responsibilities to organizations as a result of the usage of AI. This is so because administrative personnel frequently oversee a range of organizational responsibilities in addition to teaching (Forbus and Feltovich, 2001). The use of AI offers the potential to automate administrative duties for academic institutions and teachers. In order to make both academic and administrative tasks simpler, there seems to be a propensity for handling a number of non-teaching obligations, such as grading examinations, preparing assignments, and evaluating homework, as well as organizing attendance, parents' meetings, and other tasks. Education management and administration are becoming more pertinent due to the encroachment of artificial intelligence and robotic instruments that tend toward tutoring and help outside the school setting (Ku Chhaya, et al., 2020). The AI strategy has essentially produced helpful input for managing the educational system. The planet is now no bigger than a town without any walls. As a result, information, ideas, and facts are completely mobile and produced (Koko and Edo, 2014). Undoubtedly, the development of AI has improved the adaptability of educational management and administration. Almost all disciplines continue to use Smart Content as a common method for subject matter. Virtual content like video conferences and video lectures seems to be reflected in smart content. The manufacturing of textbooks is being transformed by artificial intelligence. This is so that tailored textbooks for different topic areas may be produced by AI systems using conventional syllabi (Johnson, 2019).

Statement of the problem

There are concerns associated with the usage and acceptance of AI in education. The likelihood that students may utilize AI technologies to cheat on exams or evade learning is one of the key worries. For instance, AI may produce papers or finish student projects, diminishing the task's instructional value, as Kavale and Forness (2019) point out. Some instructors have suggested reconsidering conventional examinations and switching to more imaginative and open-ended tasks that computers cannot readily do in order to mitigate this danger (Kulkarni, et.al 2015). Additionally, the emergence of AI in education has emphasized the value of helping students acquire "human" abilities like critical thinking, creativity, and problem-solving, which robots find difficult to mimic (Gee, 2018).

The possibility that deploying AI in education could increase the digital divide is another difficulty. Not all students have equal access to technology or the internet, as noted by Liao et al. (2021), which can lead to differences in their capacity to gain from tools and resources powered by AI. The current disparities in educational opportunities and results may be made worse by the digital divide. Therefore, educators must

make sure that all kids have access to AI tools and take action to reduce the digital divide by giving underprivileged populations access to technology and online resources, among other measures.

It is also crucial to understand that artificial intelligence cannot take the place of human teachers. Although AI can improve teaching and learning, it cannot take the position of human teachers, who are essential to creating learning experiences and developing deep connections with their pupils. The efficient fusion of technology and human knowledge is essential for AI in education, as Sclater and Peasgood (2018) remark. As a result, educators must adopt a hybrid strategy that combines the advantages of AI with those of human teachers. According to research, a student's ability to learn and succeed depends on their relationship with their teachers or instructors.

A favorable student-teacher connection has been linked to greater academic achievement, fewer behavioral issues, and higher levels of student involvement, according to a meta-analysis by Roorda et al. (2011). AI cannot replace the trust, respect, and communication that underpin this connection. Teachers are more able than AI to help kids emotionally, customize lessons, and adjust to their requirements.

Additionally, studies by education specialist John Hattie point to the importance of the teacher-student bond in terms of student success. Hattie discovered that teacher-student interactions had a significant beneficial impact on student outcomes, with an effect size of 0.72, in his meta-analyses of educational interventions (Hattie, 2012). This demonstrates how crucial interpersonal communication and connections are to the learning process. AI could be able to offer individualized learning opportunities, but it cannot duplicate the emotional and social advantages. The inclusion of AI literacy in the curriculum demands significant thought and design. In order for students to effectively use AI technologies, it is critical to determine the abilities and information they need to acquire, according to Mather and Yau (2019).

It is against this backdrop, that this study poses the following research questions; How can Artificial Intelligence tools enhance teaching and learning process by students? How has the adoption of AI in education widened the digital divide among the schools in rural communities in Nigeria? Does AI have the capacity to replace the critical role that human teachers play in facilitating learning experiences and building meaningful relationships with their students?

Objectives of the study

The objectives of this paper are; (i) to determine how artificial intelligence tools can enhance teaching and learning process by students (ii) to find out how the adoption of AI in education has widened the digital divide among the schools in rural communities in Nigeria and (iii) to find out if

AI has the capacity to replace the critical role that human teachers play in facilitating learning experiences and building meaningful relationships with their students.

Hypotheses

The study is guided by the following hypotheses:

1. Artificial intelligence tools can enhance teaching and learning process by students.
2. The adoption of AI in education has widened the digital divide among the schools in rural communities in Nigeria.
3. AI has the capacity to replace the critical role that human teachers play in facilitating learning experiences and building meaningful relationships with their students.

Literature review

Artificial Intelligence

Artificial intelligence (AI) is an attempt by computerized systems to replicate the human mind and actions. The general public often describes AI as the ability of robots or computers to think and react in the same manner as people do (Wartman and Combs, 2018). The successful imitation of human cognition or behavior by tools or programs is, thus, the underlying idea behind artificial intelligence (Mohammed and Watson, 2019). According to Timms (2016), the idea that artificial intelligence would be used on home computers may be a fantasy of the current system.

The creation of intelligent robots that can carry out activities that traditionally require human intellect, such as comprehending natural language, seeing patterns, and drawing conclusions from data, is known as artificial intelligence (AI). AI is a fast developing field of technology. Artificial intelligence (AI) is the ability of computers to adapt to new and developing circumstances, solve problems, provide answers, formulate plans, and carry out other intellectual tasks traditionally performed by humans (Naqvi, 2020).

Artificial intelligence in education

Effective teachers will always be required to teach lessons that encourage students' emotional intelligence, creativity, and communication, claim Manyika et al. (2017). According to these authors, developments in automation and AI will actually "make people more human." According to Haseski (2019), who is talking about educational research on AI, the use of artificial intelligence in education will make learning more personalized, offer efficient learning experiences, allow students to discover their talents, enhance their creativity, and reduce teachers' workload. However, there are also opposing viewpoints. According to studies on artificial

intelligence, it might be dangerous to replace instructors with machines (Humble and Mozelius, 2019).

Although general artificial intelligence research dates back at least to the 14th century, it only recently gained popularity due to Alan Turing's work in 1937 (Humble and Mozelius, 2019). States and countries must create a teacher profile that will work with these support systems in order to be prepared for this future (Wogu et.al, 2018). In spite of this, research on AI in education has recently drawn a lot of interest. Currently, they are becoming into an important issue in scholarly writing and scientific societies. As "artificial intelligence leadership" has begun to be investigated in the literature, we witness an extension of AI research into organizational management (Canbek, 2020).

Theoretical Framework

The paper adopted technology/diffusion innovation theory. The idea, one of the earliest in social science, was created by E.M. Rogers in 1962. It first appeared in communication to describe how an idea or product gathers steam and diffuses (or spreads) within a particular population or social system over time.

Application of the theory to the study

Technology innovation theory has important guiding significance for innovation in education and teaching: Innovative new technologies that are conducive to education and teaching will have an impact on education and teaching when the emergence of artificial intelligence (AI) and other forms of machine learning (AI/ML) begin to have an impact on education and teaching. Teachers should actively alter the way they think, investigate novel ways to incorporate artificial intelligence into the classroom, and support the thorough fusion of technology and instruction as well as the creative growth of education and teaching.

METHODOLOGY

Research design

The study adopted a documentary research design. The choice was necessary due to the nature of the study which requires the use of secondary sources of data such as relevant texts, journals, magazine, newspaper, online materials etc.

Sources and method of data collection

Data for the study was sourced mainly from documented works (secondary sources). These include: internet, website, libraries in which textbooks, journals, conference proceedings, internationally, non-governmental

organization (NGO)/ Civil Liberty publications, newspapers and magazines constitute the main sources of data.

Method of data presentation and analysis

Content analytical method was used for the study. This arises as the need for a scientific method of assessing and analyzing the large variety of data collected from secondary materials like journals, textbooks, internet sources, documents, etc. In this case, the consistency of opinion, physical prove of such opinion and the findings of other researchers that have withstood the test of time in such area serves as the yardstick for such evaluation. Therefore, each debate in the results and discussion part is predicated on certain underlying presumptions that are offered as hypotheses. These hypotheses are then either confirmed and supported, rejected, or not taken into consideration. In light of the information acquired, presentation and interpretation of the data must thus be based on inferences drawn from the problems identified in the study.

RESULTS AND DISCUSSION

Hypotheses One: Artificial intelligence tools can enhance teaching and learning process by students

There are several prospects for artificial intelligence (AI) in online teaching and learning, according to Anderson et al. (1985), Baker (2016), Roll et al. (2018), Seo et al. (2020b), and VanLehn (2011). These possibilities include anything from exams powered by AI to individualized learning for students and the automation of regular activities for instructors. For instance, by tailoring learning materials based on distinct student learning styles or skill sets, AI tutoring systems may provide personalized advice, support, or feedback (Hwang et al., 2020). Teachers can focus on other vital activities by using AI teaching assistants to spare up time from replying to students' simple, repetitive questions in online discussion forums (Goel and Polepeddi, 2016). AI analytics allows teachers to understand students' performance, growth, and potential by decrypting clickstream data (Roll and Winne, 2015; Fong et al., 2019; Seo et al., 2021; Holstein et al., 2018).

Although there are many of prospects for AI, some students and teachers may not like what AI systems do. For instance, as demonstrated by the Facebook-Cambridge Analytica data scandal, students may consider the indiscriminate collecting and analysis of personal data by AI systems to be a privacy infringement (Chan, 2019; Luckin, 2017). Students may see the actions of AI agents as discriminatory if they do not account for the possibility of algorithmic or data bias (Crawford and Calo, 2016; Murphy, 2019). The capacity of students to learn autonomously, solve issues

creatively, and think critically may be compromised if instructors rely too much on AI systems, according to Wogu et al. (2018). According to Cruz-Benito et al. (2019), it's critical to investigate how instructors and students view the influence of AI systems in online learning settings.

The impact of AI systems on online learning is a topic of ongoing investigation for the AIED group. The use of AI systems in education applications outside of the typical classroom environment and in student-teacher interactions, for instance, is supported by Roll and Wylie (2016). There is a shortage of critical consideration of the ethical implications and risks of AI systems on learner-instructor interaction, according to Zawacki-Richter; et.al (2019) did a comprehensive review of AI publications from 2007 to 2018. In their 2017 study on the implications of AI systems on education, Popenici and Kerr (2017) study on the implications of AI systems on education, found that there may be disputes between students and instructors as a result of privacy concerns, altering power relations, and oppressive control. All of these studies suggested greater research into how relationships between students and instructors are impacted by AI systems in order to identify any gaps, issues, or barriers preventing AI systems from realizing their full potential.

Hypothesis two: The adoption of AI in education has widened the digital divide among the schools in rural communities in Nigeria.

Artificial intelligence (AI) is already present in every aspect of life, resulting in a brand-new type of digital barrier known as the "AI Divide." When degrees of knowledge and intelligent use of AI are taken into consideration, this disparity extends beyond simple accessibility. In this reflection, there are four distinct levels of this divide and their detrimental effects on education, particularly when the ideal level of complete and perfect AI integration is not yet achieved. There are also approaches for each level that educational institutions can take in order to reach the level where AI is fully integrated with a meaningful context of compression and a genuine understanding of AI.

Numerous industries have been impacted by artificial intelligence (AI), and education is no exception. A new type of the split, the "AI Divide," is nonetheless forming and leading to considerable differences in educational attainment, particularly in Nigeria's rural regions. From lack of access to AI to its effective and meaningful usage, this gap is described on four different levels. These stages and the consequences of missing the fourth and final stage of significant AI integration in education are the focus of this essay.

Level 1: No Access to AI

The most basic level of the AI Divide is the lack of access

to AI technologies. This gap mirrors the digital divide, affecting individuals, groups, and regions with socio-economic or infrastructural limitations. In education, it means students or institutions lack the tools or resources for AI-enabled learning. The impact of this level can be devastating, reinforcing educational inequities, limiting exposure to personalized learning experiences, and reducing competitiveness in the increasingly AI-driven job market.

Level 2: Access to AI, but no understanding of AI

When people or organizations have access to AI but lack the knowledge to use it, it represents the second stage of the AI Divide. Poor digital literacy, a lack of appropriate training, or challenging AI interfaces can all contribute to this. The failure to fully utilize AI's potential to improve teaching and learning, inefficiency, and underutilization of resources are the negative effects. Long-term, this may result in less than ideal learning results and impede the growth of 21st-century abilities.

Level 3: Access and understanding of AI, but inefficient Use of AI

At this stage, people or organizations have access to and knowledge of AI but are unable to make intelligent and effective use of it. This predicament is frequently brought on by a lack of strategic direction, a poor integration into the current processes, or opposition to change. Ineffectiveness, resource waste, and missed chances for significant improvement in educational results are some of the negative effects. The AI Divide exacerbates these problems, which were previously exacerbated by the Digital Divide, which widened socioeconomic differences and raised educational disparities. It not only causes differences in access to resources, but also in how well these resources may be used to improve learning outcomes. The possibility of underutilizing resources, inefficient learning processes, and the spread of subpar educational outcomes increases when AI is not understood or used effectively.

Hypothesis three: AI has the capacity to replace the critical role that human teachers play in facilitating learning experiences and building meaningful relationships with their students

There are worries that as AI is developed and used in education more and more, teachers may eventually be completely replaced by AI. Some contend that artificial intelligence (AI) is more qualified than human instructors to give standardized material and evaluations and can work nonstop without becoming tired or biased. Others, however, assert that AI lacks the emotional intelligence and empathy required for efficient teaching and learning.

On the plus side, some of the tasks that instructors are accountable for can be replaced by AI due to its extensive range of capabilities. Teachers must set aside a specific amount of time to do administrative duties such as verifying attendance, overseeing assignments and the classroom, and processing paperwork. With the advent of AI, these chores may not only be taken off instructors' plates but also be completed considerably more quickly. The idea that the time-consuming administrative activities associated with teaching and learning may be completed by AI technologies without sacrificing the tasks' quality has been supported by a number of research and publications (Chen et.al, 2020; Felix, 2020; UNESCO, 2021). According to a poll, instructors devote up to 15% of their time to these activities (McKinsey and Company, 2020). By using AI technology for these chores, time may be saved and teachers can concentrate on meeting the learning needs of their pupils. AI offers a significant danger to university personnel and teaching assistants who are largely in charge of administrative tasks, as noted by Popenici and Kerr (2017). Every teacher might have a personal AI helper by 2030, according to Prof. Luckin from the UCL Knowledge Lab (Luckin et.al, 2016). Additionally, AI can help professors with student evaluation thanks to advancements in NLP, which enable tools for automated feedback delivery, plagiarism detection, and assessment scoring (Chen et.al, 2020; Goksel and Bozkurt, 2019). In comparison to human teachers, AI technologies can offer more objective and effective feedback because they are dependent on algorithms and data (Celik et.al, 2022; Terzopoulos and Satratzemi, 2019). Furthermore, it might be difficult for teachers to monitor the academic development of a group of students. Though different ITSs include functions to track and record each student's learning journey, AI can help in this area by ensuring more effective monitoring of students' learning progress. This will allow teachers to better understand their students and intervene as necessary (Celik et.al, 2022).

Second, the instructional value of AI-student interactions is inferior to that of genuine human interactions. How teachers encourage and support students in their learning is an essential component of education. Despite its potential, scholars only see AI as "cognitive prostheses" that can support teaching and learning but aren't yet able to take the place of collaborative relationships between teachers and students or the values of human thought (Cope et.al, 2021; Felix, 2020).

Thirdly, additional worries about the restrictions and downsides of AI technology also limit their uses in education. Some of the notable concerns include the dubious technical capacity and reliability of algorithms (Celik et.al, 2022), the necessary human input or training from human operators in order for AI to function properly (Wilson & Daugherty, 2018), inequality and prejudice issues arising from reliance on AI (Wogu et.al, 2018), and

the comparative disadvantage of AI in holistic and visionary thinking (Jarrahi, 2018). In general, Popenici and Kerr (2017) came to the conclusion that the value of AI at its current stage of development resides in enhancing teachers rather than totally replacing them.

Highlight of this study

The following are the main findings of the study

From the analysis of the views and opinions of the authors above, the following findings were made;

1. It was found that adopting AI systems in online learning can enable personalized learner– instructor interaction with the less risk of violating social boundaries. It has been observed that AI systems could create responsibility, agency, and surveillance issues in online learning if they violated social boundaries in each factor of learner– instructor interaction (i.e., communication, support, and presence).
2. The study further found that human connection is key to emotional bond and interpersonal skills that teachers have that are essential for students' personal growth and development. Teachers can understand, empathize, and motivate students in a way that AI cannot.
3. The study revealed that the digital divide is affecting individuals, groups, and regions with socio-economic or infrastructural limitations. In education, it means students or institutions lack the tools or resources for AI-enabled learning. The impact of this level can be devastating, reinforcing educational inequities, limiting exposure to personalized learning experiences, and reducing competitiveness in the increasingly AI-driven job market.

Conclusion

The adoption of AI has thus been steadily acknowledged in educational management and administration as the most significant method by which administrators connect organizational activities. To put it another way, institutions are increasingly using AI to reduce the amount of time needed to complete administrative tasks. This study is an unpleasant awakening for universities and instructors. On the one hand, it eases our immediate anxiety by showing the indispensable nature of teaching, but on the other, it forces them to reevaluate the value of education.

Recommendations

1. There is urgent need for the government to close the widening gap of digital divide in the rural areas by installing technological enhancements to drive artificial intelligence in teaching and learning.
2. The administrators should be intermittently

trained to be acquainted with the current trend of artificial intelligence tools used to ameliorate distance in job responsibilities.

3. Universities should collaborate on the use of artificial intelligence for effective and efficient utilization.
4. The government should make provisions for facilities to be available in every higher institution so as to adapt with innovations introduced by the adoption of artificial intelligence.

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