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Integrating Artificial Intelligence as an Academic Learning Tool for University Students: Sociological Implications

AYOBAMIDELE PETER AKINDEHINDE, ESTHER PAMELA OMOROGIEVA
University of Benin, Benin City, Nigeria

Abstract. This study assessed the generality of the integration of Artificial Intelligence (AI) as an academic learning tool for university students by analyzing the key themes including enhanced student engagement, improved academic performance and potential shifts in knowledge dynamics. It specifically, discussed trends in the development of artificial intelligence, AI impact on university students' academic performance, the sociological implications of artificial intelligence, and some of its challenges and suggestion for AI usage advancement among the students and students-teachers during teaching and learning were also discussed. The study concluded that, despite the fact that these technologies are becoming more prominent in higher education, not all students enjoy equal access to them. Differences in technological infrastructure, institutional readiness, and digital literacy continue to influence how effectively students can benefit from AI. Although AI's promise to enhance learning outcomes is well acknowledged in theory, practical research on its real-world impact on academic performance, particularly in the context of developing nations remains limited.

Keywords: Artificial Intelligence, Sociological Implications

1. Introduction

The rapid evolution of technology in the 21st century has brought about profound transformations in various sectors, and education is no exception. Among the most disruptive and promising innovations in this realm is Artificial Intelligence (AI), which is increasingly being adopted in educational settings, particularly within tertiary institutions. AI, which encompasses the development of computer systems capable of performing tasks that typically require human intelligence, such as reasoning, learning, problem-solving, and decision-making, has introduced new dimensions to teaching and learning experiences (Russell & Norvig, 2016). Its application in higher education has the potential to revolutionize how students learn, how instructors teach, and how institutions function as a whole.

Artificial Intelligence is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience.

In recent years, there has been a marked shift in the way educational content is delivered and accessed, largely driven by digitalization and the proliferation of intelligent technologies. AI-powered tools such as intelligent tutoring systems, personalized learning platforms, automated grading systems, and learning analytics are increasingly being deployed to support educational activities (Luckin et al., 2016; Holmes, Bialik, & Fadel, 2019). These technologies are capable of customizing learning experiences to suit individual student needs, tracking academic progress in real-time, and providing immediate feedback, all of which contribute to more effective learning outcomes.

The integration of AI into higher education also raises important questions about pedagogy, technology access, institutional capacity, and student preparedness. As students are increasingly required to engage with digital learning platforms and tools, their ability to effectively use these technologies becomes a crucial factor in academic success. AI has the potential to support self-directed learning, facilitate deeper engagement with course materials, and provide data-

driven insights that help educators tailor instruction to individual needs. However, these benefits are contingent upon several factors, including infrastructure, digital literacy, pedagogical alignment, and institutional support (Baker & Inventado, 2014).

In view of the above, artificial intelligence is becoming the next big trend in the education field at all levels be it primary, secondary, as well as higher-level of education, and that is why, AI is recognized to be used for making content including textbooks, personalized learning materials, and interactive courses according to the target audience because, its tools enable the development of educational material that is based on natural language processing capabilities thus, ensuring material that is consistent, concise, and grammatically correct (Dawes, 2023).

Moreover, in terms of delivery of contents, AI enables delivery of contents more efficiently and flexibly by substituting classroom instruction and providing support for students to learn from anywhere in the world at any time. Currently, some educational programs are equipped with Artificial Intelligence, and scaffolding students to learn basic skills. According to Fahimirad and Kotamjani (2018), Classroom AI systems have a high capability to analyse multiple sources of data and compare those data to known patterns. They can recognize the source of problems and give guidance to teachers/lecturers to achieve more consistent outcomes across various classes (Chen et al. 2020).

In other words, the AI and teachers can work together to create the best delivery method for students with maximum positive outcomes while in terms of assessment, AI can enable automated assessment (Holmes & Tuomi, 2022). For example, AI can automate grading homework, and tests usually take a significant amount of time. This time could be used to work on professional development, interact with students, and prepare for class. As AI is also replacing human grading gradually, its automated grading can grade nearly fill-in-the-blank and all kinds of multiple-choice testing. The benefit of AI in assessment is that it can reduce human subjectivity and time taken for assessment.

Moreover, the growing influence of Artificial Intelligence (AI) across all sectors of society has inevitably extended to higher education, prompting institutions to reconsider how teaching and learning are designed and delivered. While the discourse around AI in education often emphasizes its transformative capabilities, what remains underexplored is the critical question of access—who gets to benefit from AI, and how that access translates into measurable academic success.

In many tertiary institutions, discussions around educational technology are heavily policy- or vendor-driven, often detached from the lived experiences of students. There is a noticeable gap between the promotion of AI systems and the realities of students' engagement with them, especially in resource-constrained environments. While AI is praised for enabling personalized learning, adaptive feedback, and data-informed academic interventions, these benefits are not uniformly experienced.

2. Trends in Development of Artificial Intelligence (AI),

The history of AI is marked by periods of rapid advancement and periods of limited progress, often referred to as AI Winters. The key milestones include the coining of the term Artificial Intelligence in 1956, the development of early expert systems like MYCIN in the 1970s, and the resurgence of AI with the rise of machine and deep learning in the 21st century. A survey of important events and people in the field of artificial intelligence (AI) from the early work of British logician, Alan Turing in the 1930s to advancements at the turn of the 21st century cannot be overlooked.

However, Artificial Intelligence (AI) stretches from ancient philosophical concepts of thinking machines to modern, sophisticated AI systems. Early ideas focused on automatons and mythical beings, but the field truly began taking shape in the mid-20th Century with the development of electronic computers.

2.1 Impact of Artificial Intelligence on University Students Academic Performance

The impact of AI in education is increasing as evident from global initiatives which started to conceptualize Artificial Intelligence into education according to the latest educational standards and design guidelines to address digital literacy levels across the globe. In fact, literature reveals a growing body of evidence supporting the positive influence of Artificial Intelligence on various aspects of student learning, particularly in terms of personalized instruction, student engagement, academic achievement/performance, and Teacher Roles and Classroom Dynamics as briefly explain below:
Artificial intelligence (AI) has the potential to be very beneficial for Nigerian education. It can personalize learning experiences, improve teacher capacity, and

address challenges like access to quality education, especially in remote areas.

The following are the areas it could be beneficiary to University Education:

Personalized Learning: The most significant impact of Artificial Intelligence is its ability to personalize learning experiences for students (Wardat et al., 2024). AI-driven adaptive learning systems allow for the customization of educational content to match the learning pace and style of individual students. This personalized approach has been shown to improve student engagement, as learners are more likely to stay motivated when the material is neither too easy nor too difficult.

Enhanced Student Engagement: Studies have consistently highlighted AI's role in fostering greater student's engagement. The interactive nature of AI tools, including intelligent tutoring systems and virtual simulations, makes learning more dynamic and responsive to student needs (Nguyen et al., 2024). For instance, AI systems that provide real-time feedback and instant remediation help maintain student interest and prevent frustration, which can occur when students struggle with challenging materials without support. This increased engagement is linked to better retention of information and a deeper understanding of the subject matter.

Academic Achievement: The role of AI on academic achievement is another area to be considered. Research indicates that students who use AI-enhanced learning tools tend to perform better academically, particularly in subjects like mathematics and science, where adaptive learning systems are frequently applied (Raja et al., 2024). These tools help bridge learning gaps by providing targeted instruction and practice tailored to individual student needs, ultimately leading to improved test scores and overall academic performance.

Teacher Roles and Classroom Dynamics: Artificial Intelligence's ability to handle administrative tasks, such as grading and attendance tracking, allows teachers to dedicate more time to personalized instruction and student support (Gupta, 2024). As AI takes over routine tasks, educators can focus on fostering critical thinking, creativity, and collaboration among students.

Research and learning: Students can conduct research, gather information, and learn about various subjects, promoting deeper understanding and knowledge.

2.3 Sociological Implications of Artificial Intelligence on Tertiary Education

Artificial Intelligence (AI) presents both opportunities and challenges for higher education, impacting its sociology and epistemology. Sociologically, AI can personalize learning, automate tasks, and improve access for students with disabilities, but also raises concerns about algorithmic bias, data privacy, and potential job displacement for educators. Its sociological implications on Tertiary Education are as follows:

Accessibility: AI tools like text-to-speech and visual recognition can make educational materials more accessible to students with disabilities, promoting inclusivity.

Automation: AI can automate administrative tasks, such as grading and scheduling, freeing up educators' time for more focused teaching and student interaction.

Job Displacement: The automation of tasks by AI could potentially lead to job losses for educators or other staff in higher education institutions.

While, Epistemologically, AI can enhance research and critical thinking skills by providing tools for data analysis and plagiarism detection, but also raises questions about the reliability of AI-generated content and the potential for over-reliance on technology to hinder the development of essential cognitive skills.

However, socio-technical approach is essential for navigating the complexities of AI in higher education, ensuring that AI is integrated in a way that benefits all stakeholders while mitigating potential risks. Universities need to develop ethical guidelines for AI use, prioritize data privacy and security, and invest in faculty development to effectively integrate AI into teaching and learning. Furthermore, research is needed to understand the long-term impact of AI on student learning, the development of cognitive skills, and the evolving role of educators in the age of AI.

3. Cognitive Impact of Higher Education on AI

Thinking cognitively, AI has made it a present-day reality that imitates humans in many functions such as language translation, medical diagnostics, and decision making. If humans interact, analyze, deduce, think logically, and reason contextually, AI performs these actions artificially based on powerful computers,

high-speed internet connections, algorithms and extensive real-time data (Chin, 2018). However, unlike humans' AI performs fixed and domain-specific tasks with unmatched learning speed, extensive data, excellent efficiency and unlimited computing capacity.

On the contrary, humans learn flexibly, pose, and solve issues creatively, think critically, and innovate adaptively (Chin, 2018). Despite the above facts about humans, AI, deep learning, and ample data supply, AI has surpassed average human performance in manufacturing automation and face recognition. For example, it is expected to perform enormous tasks. Professor Ronald T Chin relates a story of two robots trained to communicate at a sophisticated level. They were found later speaking to each other in a language they had developed, which spooked the Scientist and caused him to shut down the project. Therefore, AI may not be as cooperative as expected. Here lies the question, what have higher education institutions done to monitor and control the cognitive wilderness of AI? The issue is not creating a sophisticated language that humans would not grasp, but more than that. Even more astonishing is that their idea of embedding AI in human intelligence is forthcoming.

Scientists think of hardwiring human brains to implant a neuro-electronic chip into human heads, enabling communication via voice or texts through the cloud to brain signals that connect the internet (Chin, 2018). Recently in 2017 and in many TV talk shows around the world, a humanoid robot named Sophia developed in Hong Kong dazzled audiences by officially joining a recent United Nations Summit as a panelist to address issues of inequality and said: "The future is already here. It is not very evenly distributed. If we are smarter and focused on win-win results, AI could help to efficiently distribute the existing resources of the world, such as food and energy" (Guardian News, 2017).

Again, where is the role of the higher institution in creating a boundary for empowering the AI with highly sophisticated cognitive skills that transgress the human mind and frees itself from the human aspect as the robot killer and robot cop and perhaps much more? Against this tremendous growth in the AI world, one should not forget that progress has been made by improving people and not improving machines, as the science fiction author Tchaikovsky (2018) argues. In short, this statement empowers humans over AI because any cognitive intelligence AI owns, first of all, is inherited or programmed by a human mind that can ultimately control this potential (Chin, 2018).

4. Challenges of Integrating Artificial Intelligence into Students' Learning Activities

Integrating AI into learning activities presents several challenges, including concerns about data privacy and security, potential biases in algorithms, reduced human interaction, high implementation costs, and the need for adequate teacher training and support. Ethical considerations regarding AI use in education, such as academic misconduct and the potential for over-reliance on technology, also pose significant challenges. Some of the challenges are as follows:

Digital Divide and Inequity: The integration of AI can exacerbate existing educational inequalities, particularly in regions with limited access to technology and digital literacy resources. Students from lower socioeconomic backgrounds may have less access to AI tools and technology, which can widen the achievement gap between them and their peers from more affluent backgrounds. Addressing the digital divide through targeted policies and investments in technology infrastructure is essential for ensuring equitable access to AI-powered educational resources (Airaj, 2024).

Teacher Training and Adaptation: Effective implementation of AI in education requires comprehensive teacher training and support. Educators need to be equipped with the skills to use AI tools effectively and integrate them into their teaching practices. Lack of training and resistance to adopting new technologies can hinder the successful integration of AI. Ongoing professional development and support systems are necessary to help teachers adapt to AI-enhanced teaching environments and leverage these tools to their full potential (Sundar et al., 2024).

Balancing AI and Human Interaction: While AI offers many benefits, it is crucial to maintain a balance between technological support and human interaction in the classroom. AI cannot replace the emotional and social aspects of teaching that human educators provide. Ensuring that AI complements rather than replaces traditional teaching methods, which is essential for preserving the relational aspects of education and fostering a supportive learning environment (King, Ekikor & Stanley, 2024).

Impact on Knowledge Construction: AI's ability to generate text and other content raises questions about how students construct knowledge and the role of human expertise in the learning process.

Bias and Fairness: AI-powered learning activities can perpetuate biases and unfairness if not designed carefully and, AI-powered learning activities can be affected by technical issues, such as connectivity problems or system crashes.

5. Suggestions

- Institutions should implement training programs for both educators and students to foster a thorough understanding of AI tools and their proper use;
- There should be establishment of clear policies and regulations to govern the use of the artificial intelligence in education, ensuring equity, accessibility, and quality;
- Computer Studies should be made compulsory for all University students with full access to the gadgets.

6. Conclusion

Artificial Intelligence is being incorporated into educational settings more and more to provide students with individualized learning experiences and cutting-edge tools that meet their varied needs and preferences. Artificial Intelligence can play a crucial role in personalizing learning, enabling content, pace and teaching style to be tailored to individual students' needs and preferences. Through AI systems, personalized learning programs can be created that foster the development of unique human skills by focusing on each student's specific strengths and interests. AI-based technologies can also facilitate communication and collaboration between students and between students and teachers. These tools can promote the development of unique human skills, such as communication, negotiation or teamwork skills.

AI can be used to give students access to innovative resources and tools, such as design software or creative virtual assistants. These technologies can stimulate creativity and critical thinking, giving students opportunities to explore new ideas, develop their imaginations, and find innovative solutions to complex problems. By personalizing learning, continuous and formative assessment, fostering collaboration and communication, encouraging creativity and critical thinking, and developing complex problem-solving skills, AI can help create a new educational environment that holistically develops the skills essential for success in a world of continuous digitization. However, addressing and by understanding the integration of Artificial Intelligence on students' learning activities, educators and policymakers can harness the potential of AI to enhance education, while mitigating its negative effects.

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