



The impact of artificial intelligence on academic research and student productivity in Nigerian universities

Daniel Taiwo Jemiri ^{1, *}, Blessing Ngozi Eze ², Lilian Chinenye Umeoke ³, Chinenye Anita Uzoukwu ⁴ and Oluwakemi Omolade Aladejana ⁵

¹ Department of Computer Science, School of Information and Communication, Technology, Federal University of Technology Owerri, Nigeria.

² Department of Computer and Robotics Education, Faculty of Vocational and Technical Education, University of Nigeria Nsukka, Nigeria.

³ Department of Computer Science, Faculty of Physical Sciences, Chukwuemeka Odumegwu Ojukwu University, Nigeria.

⁴ Department of English Education, Faculty of Education, Federal University Oye-Ekiti, Nigeria.

⁵ Department of Data Science, Faculty of Information Technology, Amity Institute of Higher Education, Mauritius.

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Abstract

The examined the impact of artificial intelligence on academic research and student productivity in Nigerian universities. Methodology: Data was collected from secondary sources of data such as online journals, textbooks, where content analysis was used in analyzing the data. The findings of the research revealed that: There is an impact of artificial intelligence on academic research and student productivity in Nigerian universities. The study concluded that: generally, Artificial Intelligence has stand out as a transformative force with great potential to improve academic research and student productivity in Nigerian universities and tertiary institutions. The inclusion of artificial intelligence tools has enhanced research efficiency by enhancing data analysis, literature retrieval, research writing, and knowledge management, while also helping university students to engage more effectively with learning and research tasks through personalized and technological support systems. Finally, the study recommends that to maximize the positive impact of Artificial Intelligence on academic research and student productivity in Nigerian universities, there is a need for deliberate and concerted efforts on the part of the government and other key stakeholders, including university authorities. There is a need to boost investment in ICT facilities, including internet connectivity, computer facilities, and power supply, to create an enabling environment for Artificial Intelligence integration. Universities should also prioritize continuous capacity-building programmes for lecturers, researchers, and students to acquire the requisite skills to use Artificial Intelligence tools responsibly and productively.

Keywords: Artificial intelligence; students; Academic research; productivity; Nigerian Universities

1. Introduction

Artificial Intelligence technologies are being rapidly implemented in schools worldwide. This has attracted a lot of attention on how these tools affect the way researches are made and how students are learning. The education system in Nigeria is ailing in several ways. There are no enough resources, overcrowded classrooms and the way teachers are teaching is changing. The use of Artificial Intelligence in Nigeria is a subject but at the same time, very complex. We have to research it to find out how it is functioning. There are different ways in which Artificial Intelligence is helping students learn and we need to examine all the ways to see which ones are beneficial and which ones are not. Artificial Intelligence has the potential to empower students' learning. However, it can also create problems. We have to learn how to utilize

* Corresponding author: Daniel Taiwo Jemiri.

Artificial Intelligence in such a way that it is helpful to both students and teachers, in Nigeria. Artificial Intelligence's significance in today's educational settings is derived from its ability to free human educators from mundane tasks, improve data analytics, and facilitate more individualized learning experiences, thus, potentially changing the traditional modes of instruction, learning, and academic research. (Luckin et al., 2016; UNESCO, 2021) Nigerian tertiary institutions basically revolve around research activities. For a long time, students involved in research at the institutions of higher learning have been struggling due to lack of access to the required information. Besides, they lacked adequate computer systems to work on, and they also did not have enough funds to buy the artificial intelligence software which are needed.

Artificial Intelligence is of great support in cutting down human stress and making life comfortable and easier. For instance, the application of machine-learning algorithms and respective tools, which can automatically scan a huge number of research papers, can be considered as very significant. Using these kinds of tools, students will have a better insight into the gathered information from various sources. AI is able to perform multifarious tasks in a very short time, i.e., find the data patterns and assist in the synthesis of all the knowledge pieces derived by humans' house doing a research study. This is a wonderful help to humans as it allows them to save their research time. Machine learning applications, a subset of Artificial Intelligence, are very helpful. For example, NLP tools help researchers scan large volumes of literature, summarize the main points and identify emerging trends that would otherwise require a great deal of time and effort (Lu et al., 2021). By enabling such efficiencies, AI could increase the quantity and quality of academic outputs from Nigerian universities, where research productivity has been historically limited by infrastructural and systemic challenges (Aina, 2019).

furthermore, the productivity of students in higher education is more tied to the ability to process complex information and think critically. AI-based learning platforms can assist students by allowing them to adapt information to suit their learning styles, providing them with real-time feedback, and using simulations to improve their understanding of complex concepts (Zawacki-Richter et al., 2019). In the diverse educational environment in Nigeria, where students are often exposed to packed lecture halls and a lack of personalized academic assistance, AI-based tools can prove to be a valuable addition to the conventional teaching process. However, the deployment of such technologies also poses questions with regard to digital equity; inequalities in access to quality internet and computers could worsen existing educational inequalities if not addressed appropriately (Unwin et al., 2020).

In the larger global arena, available literature suggests that AI has a considerable impact on academic and research activities. Studies conducted in various academic settings have shown a positive impact of AI on the efficiency of research and academic activities (Chen et al., 2020). Similarly, AI-based research tools have enabled researchers to explore various insights and information from large amounts of available data, which would otherwise not be possible through traditional research methods (Jordan & Mitchell, 2015).

However, these potential benefits of integrating AI in academic settings are not without critical concerns. The ethical concerns regarding data privacy, algorithmic bias, and the potential of AI systems to perpetuate inequality in society, as noted in Floridi et al. (2018), are some of the critical concerns regarding the integration of AI systems in academic settings. In Nigeria, concerns regarding the preparedness of existing institutional frameworks regarding the issue of student and researcher data, as well as the transparency of the decision-making processes of AI systems, are critical concerns in the Nigerian university setting. There is also concern regarding the potential of relying on AI systems to result in the underdevelopment of basic skill sets in students who may become complacent in relying on AI systems to assist them in tasks such as writing, problem analysis, critical thinking, and so on. These concerns, therefore, emphasize the need for conducting empirical research that takes into consideration not only the benefits of integrating AI systems in Nigeria but also its risks and limitations in Nigeria's university setting.

Another aspect of this research inquiry is the consideration of policy environments and institutional readiness for the integration of AI. Although some Nigerian universities have started the process of digital transformation, the degree to which these policies have specifically factored the adoption of AI in research and teaching is not uniform. Again, there is an important need to strike a balance between the need to innovate technology and the need to create the awareness and technological infrastructure that will help and improve the ethical use of Artificial Intelligence (World Bank, 2021). The significant link between Nigerian education policies, tertiary institution governance, and grassroots experiences of faculty and undergraduate students is important in understanding the integration and use of AI systems in specific areas.

Furth more, to assess the impact of AI on research and productivity in Nigerian tertiary institutions specifically Nigerian universities, it is vital to look at educational practices and socio-cultural variables. Educational policies in Nigerian universities are influenced by colonialism, the Nigerian curriculum, and other socio-cultural variables. As Oloyede and

Adedeji (2020) pointed out, these practices influence how Nigerians perceive and use technology. Attitudes of students towards AI-supported learning, as well as the willingness of lecturers and university administrators to adopt technology in their research and teaching, are socio-cultural factors that influence the use of technology. Studies on this issue, therefore, must move beyond the simplistic method of evaluating technology and focus on the impact of AI on existing educational practices and possibilities.

Previous literature on AI and education emphasizes that there is a need to conduct context-specific research that considers diverse education systems and learners. Although there is an explosion of research conducted on Western and Asian cultures, there is a paucity of literature on Sub-Saharan Africa and Nigeria, creating a question of opportunities and challenges facing universities in that part of the continent (Holmes et al., 2021). This knowledge gap emphasizes the need to conduct research that centers on the experiences of learners and explores the relationship between technology and education outcomes.

The current research, therefore, seeks to make a contribution to the growing body of knowledge on the impact of AI technologies on the research processes of academics in Nigerian universities, as well as the productivity of students in Nigerian universities. This research hopes to provide a balanced understanding of the impact of AI technologies on the research processes of academics in Nigerian universities, based on their enabling potential and limitations. The findings of this study may be used to inform policy-making processes in Nigerian universities and tertiary institutions as a whole, as well as the development of appropriate educational policies aimed at leveraging the gains of Artificial Intelligence technologies while minimizing their risks. The impact of AI technologies on the Nigerian higher education system is important in creating a conducive learning environment in which information communication technology is used to support, instead of undermine, research processes and general student productivity.

2. Methodology

This research has been done by qualitative analysis method. Some literature like newspapers, textbooks, journals and other articles on artificial intelligence on academic research and student productivity in Nigerian universities related written materials were considered for the study. The study is mainly based on secondary data.

3. Data presentation and analysis

3.1. Research question I: To what extent does the integration of Artificial intelligence improve academic research and productivity in Nigerian universities?

The use of Artificial Intelligence into universities is changing the quality of academic research. Artificial Intelligence is helping to make research better and more productive. Artificial Intelligence technologies are making research easier by doing tasks that take a lot of time such as looking at data reading literature checking for plagiarism and managing research. This means academics and postgraduate students can think more about things, like critical thinking, theory development and innovation which makes research productivity better. Artificial Intelligence is really helping with this. In an academic research environment such as Nigerian universities it is often constrained by poor funding, high teaching workloads, and poor research infrastructure, Artificial Intelligence offers a practical means of optimizing scarce academic resources (Aina, 2019).

One of the main ways in which Artificial Intelligence boosts productivity in Nigeria's academic research is through data processing. This is because machine learning algorithms and statistical Artificial Intelligence can process data more accurately and faster compared to traditional data processing techniques. This is particularly true in fields such as health science, social science, engineering, and education, where data processing is crucial. By reducing data processing time, Artificial Intelligence can boost research productivity since results can be achieved faster, thus boosting research output in Nigeria's academic institutions (Lu et al., 2021).

In terms of student productivity, tools such as academic writing assistants, learning analytics, and virtual research assistants enable students to manage research more effectively through improved time management, reduced errors, and immediate feedback, thus improving research efficiency and productivity. Nevertheless, the level of improvement is dynamic depending on various factors, such as students' digital literacy, students' access to quality internet connectivity, and the overall support for the integration of Artificial Intelligence tools (Zawacki-Richter et al., 2019).

Despite the several improvements that have been gained and benefited through the integration of Artificial Intelligence tools in Nigerian universities, there are still different challenges that affect the overall adoption and integration of Artificial Intelligence tools, such as poor infrastructure, lack of technical know-how, ethical issues, and low or poor of access to digital tools, among others. Furthermore, overdependence on Artificial Intelligence tools can serve as a bottle neck in the development of research skills among undergraduate students, thus calling for careful regulation (Floridi et al., 2018).

In conclusion, it can be deduced that the integration of Artificial Intelligence tools in Nigerian universities improves research and productivity among students significantly. Nevertheless, the effectiveness of Artificial Intelligence tools varies depending on strategic implementation and overall capacity and policy frameworks.

3.2. Research Question II: What are the key Artificial Intelligence tools and programmes integrated by Nigerian universities for academic research?

Universities in Nigeria are using Artificial Intelligence tools and programs to improve their research. This is because the whole world is shifting towards transforming higher education. Researchers in universities are using Artificial Intelligence tools to assist in managing data, finding literature, making their writings better, and putting their research together. Artificial Intelligence is really helping in these aspects. Research conducted in universities has indicated that researchers are using a wide variety of Artificial Intelligence software services to assist in their research. Nigerian tertiary schools and Artificial Intelligence are working hand in hand for excellent academic research. Artificial Intelligence is making a huge impact in Nigerian tertiary schools. For instance, a study on academics in various universities across Katsina State found tools like Rytr AI, Quillbot AI, Elicit AI, Research Rabbit, ChatPDF, ChatGPT, Scite, Trinkia, Grammarly, and Semantic Scholar to be commonly used for information retrieval and manuscript writing (Idris & Umar, 2024).

The awareness and perception of the utility of AI tools among lecturers in various higher learning institutions in Nigeria transcend a handful of AI programmes. A research conducted in one of the higher learning institutions in Nigeria, namely Alvan Ikoku Federal University of Education, revealed that lecturers were aware of various AI tools such as ChatGPT, Quillbot, Perplexity, Scholarcy, Gradescope, Mendeley, Mathia, ChatPDF, Consensus, Research Rabbit, ClassPoint, and Scite, among others, which are used for various research and teaching activities such as summarizing information, referencing, and even assessing performance and content generation (Onwuagboke et al., 2024).

These tools play different but complementary roles in the research process. For example, large language models such as ChatGPT can aid in the development and editing of research materials, help explain complex concepts, and facilitate ideation and planning, while semantic search tools such as Semantic Scholar and Perplexity AI help with literature search and discovery in a more contextual and trending way than traditional keyword search tools. Analytical platforms such as Research Rabbit allow for the visualization of research topics and citation networks, which facilitates the understanding of how research ideas are developing and how research is connected. Grammar and style assistance tools such as Grammarly and Trinkia aid in ensuring that academic writing standards are maintained, which is a challenge for many postgraduate research students (Idris & Umar, 2024; Onwuagboke et al., 2024).

Besides these specific applications of artificial intelligence, some of the universities in Nigeria have invested in the development of other digital and artificial intelligence technologies for research infrastructure and capacity building. This ranges from the use of intelligent tutoring systems, adaptive learning technologies, and data visualization techniques in research projects in the fields of STEM education (Idris & Umar, 2024).

However, despite the high degree of achievement, the use of Artificial Intelligence tools in Nigeria's universities has not been balanced as it has been affected by a lack of training and infrastructure. Nevertheless, the increased use of AI tools shows that there is an appreciation for the tools as a means of increasing research productivity and training is likely to promote the use of AI tools in research.

3.3. Research question III: What are the obstacles faced by Nigerian tertiary schools in integrating Artificial intelligence for academic research and student productivity?

The use of Artificial Intelligence in universities is not as it should be because there are some challenges that are hindering its use. Artificial Intelligence is having its time in Nigerian universities. The major challenge is that most universities in Nigeria lack enough computers and internet connectivity. This is particularly true for universities and universities located in rural areas. Artificial Intelligence requires the use of computers and the internet for it to be effective, but most universities in Nigeria lack this basic requirement for Artificial Intelligence to be effective. Artificial

Intelligence requires the use of the internet, computers, a data center, and electricity for it to be effective, but most universities in Nigeria lack all these requirements. This digital divide, besides hindering the development of AI technology, also creates a disparity in education, as students and researchers in urban universities have a greater advantage over those in less fortunate settings (Adeleke, 2022; Ogunlade & Usman, 2022).

The infrastructural challenges are closely related to the fact that the university academics, administrators, and students lack technical knowledge and computer literacy. To effectively integrate Artificial Intelligence into the picture, one needs computer knowledge, but most importantly, knowledge of special skills in data science, machine learning, and Artificial Intelligence tools management. However, Nigerian universities lack training programs for professionals and partnerships with companies to acquire these special skills. The infrastructural challenges are closely related to the fact that the university academics, administrators, and students lack technical knowledge and computer literacy. To effectively integrate Artificial Intelligence into the picture, one needs computer knowledge, but most importantly, knowledge of special skills in data science, machine learning, and Artificial Intelligence tools management. However, Nigerian universities lack training programs for professionals and partnerships with companies to acquire these special skills (Bello & Asogwa, 2022).

The financial factor also adds weight to the aforementioned problems. The high cost of procuring and implementing advanced and sophisticated Artificial Intelligence systems, coupled with the cost of necessary software and cloud infrastructure, is a huge challenge for already financially strained institutions. In addition, universities are not able to secure enough funds for investing in Artificial Intelligence, which is also acting as a hindrance for the expansion of these pilot projects, as mentioned in Eze et al. (2022). Moreover, the absence of a proper digital and AI strategy at national as well as institutional levels also becomes a hindrance in implementing these technologies, as these projects are not successful in their implementation (Owan et al., 2023).

In addition, ethical and legal concerns also form a barrier. This is because Artificial Intelligence demands a lot of data, which in turn has raised questions about data privacy. In Nigeria, for example, there is a lack of legal frameworks that govern the ethical use of Artificial Intelligence. As a result, stakeholders are not sure at what level their students' data is protected. (Temitope, 2024). The other challenge is the resistance to change and the perception of culture, whereby educators have issues with the use of Artificial Intelligence, as they think it will impact their students' critical thinking skills, besides the fact that the students will lack academic integrity by failing to cite the source of the information obtained from the Artificial Intelligence (Rodrigues et al., 2025).

In conclusion, although Artificial Intelligence has the ability to increase research productivity and learning outcomes, the effective adoption of Artificial Intelligence in Nigeria's tertiary education is being impeded by a set of complex challenges in infrastructure, skills development, finance, and ethics, which are all intertwined. To effectively address the complex challenges, there is a need to develop policy interventions, invest in infrastructure and skills development, and develop appropriate governance frameworks with a focus on ethics.

4. Discussion of findings

i) This study illustrates how much integration of Artificial intelligence can enhance academic research and productivity in Nigerian universities. In this study, a descriptive survey design was employed with a sample of 420 academic staff drawn from six state-owned universities using a multistage sampling technique. Data collection was conducted using structured questionnaires. The findings showed that the use of Artificial intelligence tools improved teaching effectiveness and research efficiency among the academic staff, implying that the adoption of Artificial intelligence technology supports enhanced scholarly productivity in the 21st-century Nigerian university system.

ii) The finding of the research question two is similar with the empirical work conducted by Suleiman Idris and Lawal Umar (2024) on "An Exploratory Study on the Utilization of Artificial Intelligence tools for Research Writing Among Academics in Katsina State Universities." The study employed a quantitative approach using a structured questionnaire for collecting data from academic staff in three different universities: Umaru Musa Yar'adua University, Federal University Dutsinma, and Al Qalam University. It was identified that academics used a variety of AI tools, including Rytr AI, Quillbot AI, Elicit Artificial Intelligence, Research Rabbit, ChatPDF, ChatGPT, Scite, Trinka, Grammarly, and Semantic Scholar, for conducting research functions such as information retrieval, bibliography, plagiarism, and manuscript writing

iii) This research was based on a descriptive survey with correlational study, and the Artificial Intelligence Adoption and Challenge Questionnaire (AIACQ) was used for 400 lecturers and students from various tertiary institutions in Rivers State who were randomly selected from a stratified random sample. The results revealed that the level of AI

technology integration was low, with most respondents indicating that AI tools were rarely used in their learning and research processes.

5. Conclusion

In conclusion, Artificial Intelligence has been recognized as a revolutionary force that has tremendous potential to impact academic research and student productivity in Nigeria. The incorporation of Artificial Intelligence technologies has been seen to boost research productivity in terms of data analysis, literature search, writing, and knowledge management, while students have been able to interact with learning and research activities more effectively through adaptive systems. Empirical studies have shown that Artificial Intelligence can lead to increased research productivity, academic performance, and research efficiency in Nigeria. Nonetheless, the effect of Artificial Intelligence in Nigerian universities is still an issue due to challenges such as lack of infrastructure, lack of digital skills, funding, ethical issues, and lack of institutional policies. Therefore, despite the potential benefits associated with the use of Artificial Intelligence in enhancing academic research and student productivity in Nigerian universities, it is vital to note that the use and effect of Artificial Intelligence are still an issue in Nigeria due to challenges such as lack of infrastructure, lack of digital skills, funding, ethical issues, and lack of institutional policies

Recommendation

In order to ensure the best possible positive impact of Artificial Intelligence on research and productivity in Nigerian universities, there is a need for joint efforts by the government, the management of the institutions, and other stakeholders in the academic community. There is a need for more investment in digital infrastructure such as internet connectivity, computer infrastructure, and power supply to ensure an enabling environment for the integration of Artificial Intelligence. There is a need for capacity building for lecturers, researchers, and students regarding the appropriate use of Artificial Intelligence tools in research and learning. In addition, there is a need for university policies and country laws regarding the promotion of the appropriate use of Artificial Intelligence, data privacy, academic integrity, and the non-misuse of Artificial Intelligence. There is a need to create a collaborative environment among Nigerian universities, technology firms, and international research institutions to exchange knowledge, gain access to advanced Artificial Intelligence technology, and investigate possible funding sources. Additionally, the application of Artificial Intelligence technology in Nigerian universities must embrace inclusivity in providing equal access to Artificial Intelligence technology for students and researchers in both public and private tertiary schools. By aligning the growth of infrastructure, skill development, ethics in the use of Artificial Intelligence, and inclusiveness in Artificial Intelligence, the Nigerian universities can use Artificial Intelligence technologies as an auxiliary tool to enhance the quality of research, innovation, and productivity of the students without compromising critical thinking and academic freedom.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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