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PERCEIVED IMPACT OF ARTIFICIAL INTELLIGENCE ON EFFECTIVE LEARNING IN TERTIARY INSTITUTIONS IN SOUTH-EAST NIGERIA

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Abstract - The study investigated the perceived impact of artificial intelligence on effective learning in tertiary institutions in South-East Nigeria. Two research questions and null hypotheses guided the study. The study adopted a descriptive survey research design. The population comprised 620 computer students purposively sampled from two universities from the South-East made up of 350 males and 270 females.. A researcher-designed instrument titled Perceived Impact of Artificial Intelligence for Effective Learning in Tertiary Institutions Questionnaire (PIAETQ) was used for data collection. The questionnaire was face validated by three experts from the Department of Educational Foundations and Department of Science Education, University of Nigeria Nsukka. The reliability estimate was obtained using Cronbach Alfa method which an overall coefficient of 0.78. Mean and standard deviation were used in answering the research questions while t-test was employed in testing the hypotheses at 0.05 level of significance. The findings from the two research questions revealed among others that areas of application of AI in tertiary institutions in South-East included school administration, maintenance of security, school data management and teaching activities while the result of the second research questions revealed the perceived impact of AI on students in tertiary institutions in South East to include AI enhancing students learning activities, encouraging effective assessment of students, promoting the availability of learning resources, research studies and enhancing, enhancing school administration among others. The result of the two hypotheses revealed no significant differences between male and female computer students in the areas of application of AI and the perceived impact of AI in tertiary institutions in the South-East. Nigeria. The study among others recommended that tertiary institutions in the South-East should embrace AI with its multi-dimensional potentialities while integrating it into the nation's tertiary institutions' academic programmes

Keywords: artificial intelligence, internet, teaching, learning, higher institution.

Introduction

The rapid advancement of digital technology has transformed virtually every aspect of human activity, including how knowledge is delivered, acquired, and managed in educational institutions. In this context, artificial intelligence (AI) has emerged as a transformative tool with significant implications for teaching and learning, particularly in higher education where the demand for efficiency, personalization, and innovation is high. Tertiary institutions constitute the university, polytechnics, and colleges of education that offer higher education to students in various disciplines across the country. The goals of tertiary education, according to the Federal Republic of Nigeria (2014) in her National Policy on Education, are to: contribute to national development through high-level manpower training; provide accessible and affordable quality learning opportunities in formal and informal education in response to the needs and interests of all Nigerians; provide high-quality career counseling and lifelong learning programs that prepare students with the knowledge and skills for self-reliance and the world of work; reduce skill shortages through the production of skilled

manpower relevant to the needs of the labour market; and promote and encourage scholarship, entrepreneurship, and community service, among others. The attainment of these goals and objectives of tertiary education depends on the availability and effective utilization of both human and material resources, among which artificial intelligence is increasingly gaining relevance. AI can be strategically integrated into teaching and learning to facilitate automated instruction, adaptive feedback, intelligent tutoring systems, and data-driven decision-making processes. Therefore, understanding the perception of students, particularly computer students who are both users and potential developers of AI technologies, is crucial for evaluating its impact on effective learning in Nigeria's tertiary institutions.

Artificial intelligence is an innovation which many scholars perceive differently. Akinwalere and Inanov (2022) defined AI as a technological innovation that is committed to making the lives of humans a lot easier in the society. According to Pasaribu and Widkjaja (2022), AI is explained as the ability of machines or computers to imitate intelligent human behaviour such as problem solving, decision making and learning. In another definition, Bostrum (2017) saw AI as a booming technological domain that has the capacity to alter every of man's social interactions. This implies that AI is a technological breakthrough and an asset to humanity as every area of human endeavour stands to benefit from its multidimensional potentials. Consequently, the education industry, especially higher education is one relational and interactive human social practice and institutions that stands to gain more from the opportunities that are offered by AI. The integration of AI into the nation's higher educational level in this 21st century can bring about valuable contributions to teaching and learning. This is because education is a worldwide industry which when integrated with AI will bring about improvement in principles, methods and practices. For the nation's educational system to meet up with international standards there is the obvious need for a total digital revolution through the use of robotics and machines that enhance effective and efficient teaching and learning processes (Ayuba, 2024). The nation's multifaceted problems in education can be remedied through the application of AI in the nation's institutions. This is because teaching and learning currently appear beyond face-to-face interaction between the teachers and the learners in the classroom situation. This can be taken care of by improved technology using robots and machines with human intelligence.

The issue of reliable instructional facilities facing teaching and learning can be reduced when the machines or robotic devices are effectively integrated to support the available instructional aids with and outside the classroom. Moreover, if seriously adopted and managed, artificial intelligence can help to solve the problems of infrastructural facilities, insecurity, as well as scarcity of qualified academic and non academic staff in nation's educational institutions. In tertiary institutions, artificial intelligence will bring transformative opportunities particularly in the field of teaching and learning. Aliyu and Yusuf (2024) asserts that in a country like Nigeria, where the education sector faces numerous challenges, such as inadequate infrastructure, lack of qualified teachers, and inconsistent access to learning resources, AI has the potential to bridge significant gaps. This implies that artificial intelligence is of fundamental importance in education, particularly teaching and learning as its adoption and effective use has the potentials to stimulate higher achievements in teachers and learners. It is on the basis of this that Akinwalere and Inanov (2022) opined that artificial intelligence promised important benefits for education, such as in the area of personalized learning according to the preferences of each student, helping them to learn at their own pace and control iterations to improve their mastery of any preferred or chosen topic.

Moreover, artificial intelligence can also provide the needed roadmaps for learning methodologies by introducing new paradigms in how education is delivered and processed.

According into Wang and Chew (2024) these dialogue-based systems not only optimize teaching efficiency and quality but also serve as catalysts for learner creativity and engagement, offering personalized learning experiences that adapt to individual needs. This means by implication that artificial intelligence is associated with many prospects especially in the education industry. Integrating artificial intelligence into the educational system in Nigeria has the potential to elevate teaching standards, enhance learning results, and offer students tailored educational experiences (Nwaokugha1 & Abiakwu, 2024). Therefore, the perceived areas of impact of artificial intelligence in the nation's higher education level are highlighted in this study. Artificial Intelligence has great potential to increase the effectiveness and efficiency of the learning process for both lecturers and students in tertiary institutions. For instance, ChatGPT can provide significant benefits if used optimally. Lecturers can use ChatGPT to design curriculum, draw lesson plans, and convey learning material interestingly and interactively. The language model can provide feedback quickly and accurately, assisting teachers in providing additional explanations or corrections when needed. In addition, ChatGPT can assist in compiling more creative learning content according to student needs (Russell & Norvig, 2010).

Hence, the application of Artificial Intelligence in schools and tertiary institutions in Nigeria can help improve the quality of education and produce better-quality graduates. Jacob (2024) asserts that AI has significant potential to revolutionize Nigeria's education system by personalizing learning experiences, improving student engagement, and streamlining administrative processes. This is particularly important in Nigeria, where classrooms are often overcrowded, and teachers may struggle to cater to each student's unique needs (Aliyu & Yusuf, 2024). The intersection of artificial intelligence (AI) and education represents a swiftly advancing domain with great potential to transform the educational experience of both the lecturers and students in tertiary institutions. AI presents a valuable opportunity to improve teaching and learning approaches, rendering them more efficient, engaging, and accessible. Similarly, AI applies Intelligent tutoring systems (ITS) defined as computer-based educational systems that have independent databases, or knowledge bases for educational content in addition to teaching strategies and try to use conclusions about the learner's ability to understand topics and identify his weaknesses and strengths so that they can adapt the learning process dynamically (Alrakhawi, Jamiat, & Abu-Naser, 2023). The ITS use artificial intelligence techniques to mimic the guidance a human tutor offers, tailoring educational content, problem-solving support, and feedback according to the student's individual learning needs, style, and pace.

The application of Intelligent Tutoring Systems in the teaching and learning in tertiary institutions allows for the development of tailored learning pathways for students in areas of the needs. This system is capable of evaluating each student's existing knowledge and pace of learning, thereby facilitating a more customized educational experience. Additionally, it can provide prompt feedback regarding students' comprehension of Islamic jurisprudence. Thus, implementing ITS in schools and tertiary institutions can enhance learning efficiency, promote deeper engagement in students' disciplines, and allow for a more student-centered approach. Furthermore, AI can apply content creation and delivery. This refers to the process of developing educational material (content) and distributing it to learners in an accessible, engaging, and effective way. In the context of teaching, especially in students' area of studies, this involves producing relevant instructional materials (such as books, videos, interactive activities) and delivering them through various platforms (in-person classes, online learning environments) to ensure students understand and engage with the subject matter. AI can assist in generating educational content, translating materials, and delivering

lessons through innovative platforms, making knowledge more accessible to a wider audience (Nwaokugha1 & Abiakwu, 2024). It involves creating resources like textbooks, lesson plans, multimedia presentations, quizzes, or e-learning modules.

Moreover, AI employs assessment and evaluation tools which can transform the way students' learning progress is measured, making the evaluation process more efficient, personalized, and interactive. AI-based assessment tools can analyze students' performance, provide feedback, and suggest areas of improvement, all while freeing lecturers from the repetitive tasks of grading and evaluation. According Nwaokugha1 and Abiakwu (2025), here are some key AI tools that instructors can use in assessment and evaluation in this field: automated grading and feedback, plagiarism detection, language processing for text analysis, virtual tutors and chatbots and data analytics for curriculum improvement. Through the application of the above AI assessment tools lecturers can offer more tailored and efficient learning experiences, focusing more on interactive teaching and less on administrative grading tasks. This ultimately helps students gain deeper mastery of Islamic knowledge in a more dynamic and engaging manner. A number of studies have been carried out on artificial intelligence in institutions and beyond. Artificial Intelligence (AI) is progressively transforming the educational landscape, influencing how learners engage with content and digital tools. However, the proficiency of elementary school pupils in using AI for learning remains limited, with a significant portion lacking the competence to harness AI effectively for educational advancement, as shown in the study by Agarry, Omolafe, Animashaun, and Babalola (2022). This limitation is often associated with restricted access to advanced digital resources. The ability of students to navigate AI and other digital technologies depends heavily on their exposure to modern ICT tools. An assessment by Onyema, Ogechukwu, and Deborah (2019) revealed that undergraduate students in Nigeria perceive ICT as a vital enabler of academic learning, especially when integrated through mobile devices that support interactive and collaborative experiences. During the COVID-19 pandemic, the application of the Google Classroom platform demonstrated a measurable positive effect on students' academic outcomes. In the realm of distance education, Ajadi, Salawu, and Adeoye (2008) examined both the theoretical and applied dimensions of AI-powered e-learning systems at Nigeria's Open University, where such technologies are used to support lectures and assignment submissions. Despite this progress, many universities across Nigeria are yet to fully embrace digitalization. The implementation of e-learning nationwide, according to Oyediran, Omoare, Owoyemi, Adejobi, and Fasasi (2020), is critical for mitigating brain drain and revitalizing Nigeria's educational framework. As AI continues to evolve, its transformative influence on global education is inevitable. Robinson (2018) warns that the advancement of AI could eventually replace many human functions, underscoring the urgency for Nigeria to prioritize AI development within its academic institutions.

Artificial Intelligence (AI) presents immense opportunities for research, innovation, and advancement in the educational sector. Its integration into teaching and learning enables educators and researchers to uncover new insights, preserve academic heritage, and expand global access to knowledge. In particular, AI tools have the potential to transform educational delivery in Nigerian tertiary institutions by enhancing student engagement, supporting adaptive learning, and facilitating real-time feedback mechanisms. Despite challenges such as infrastructural limitations and ethical concerns, thoughtful and strategic implementation of AI holds promise for revolutionizing Nigeria's higher education system. With AI, institutions can develop dynamic, responsive, and inclusive learning environments that benefit both lecturers and students. Accordingly, this study focused on two prominent Nigerian universities, University of Nigeria, Nsukka and Nnamdi Azikiwe University, Awka—where

undergraduate students in the Department of Computer Science were purposively selected to examine their perceptions of AI in effective learning. In addition to the general inquiry into AI's impact, gender was employed as a key variable in this study. Gender differences have been identified in multiple studies as influencing students' interaction with technology, including AI-driven tools. Adebayo, Bello, and Olayemi (2019) reported that male students in Nigerian universities often demonstrate higher confidence and digital competence than their female counterparts, attributable to earlier exposure and sociocultural factors. Similarly, Eze, Anyaogu, and Igwe (2020) found that female undergraduates showed relatively lower engagement levels with educational technologies, citing access disparities and lower technological self-efficacy. Iwuoha and Nwachukwu (2022) also noted that gender stereotypes continue to shape students' attitudes toward STEM fields and technology use in general, reinforcing digital inequalities. As such, examining gender-based perceptions of AI is crucial for understanding the nuanced experiences of male and female students in higher education. The inclusion of gender as a variable, therefore, allows this study to identify potential gaps and propose targeted strategies that foster inclusive adoption of AI technologies across student groups. Notwithstanding the growing body of literature on ICT and digital learning, empirical studies focusing specifically on gendered perceptions of AI use in Nigerian tertiary institutions remain scarce. This study addresses that gap by investigating how undergraduate students perceive the role of AI in effective learning, with a particular emphasis on gender differences within the context of South-East Nigeria.

Statement of the Problem

Artificial Intelligence (AI) has emerged as a transformative force in education, offering innovative ways to enhance teaching, learning, research, and administrative functions in tertiary institutions. Ideally, institutions of higher learning are expected to harness AI tools and systems to personalize learning, support real-time feedback, streamline administrative processes, and promote data-driven decision-making. However, the reality in many tertiary institutions in South-East Nigeria reflects a significant gap between the potential of AI and its actual implementation. AI applications in these institutions are still in their infancy, with limited integration into classroom instruction, student assessment, administrative operations, and academic research. Challenges such as inadequate infrastructure, poor digital literacy among staff and students, and lack of institutional readiness continue to hinder progress. This gap between the ideal and the actual situation raises concern about how AI is perceived and the extent to which its potential benefits are being realized in the region. There remains a lack of empirical data on the perceived impact of AI on effective learning in these institutions, making it difficult to inform policy, training, and infrastructure development. The problem of this study, therefore, is that despite the growing relevance of AI in education globally, its perceived impact on effective learning in tertiary institutions in South-East Nigeria remains unclear, underutilized, and insufficiently documented. This has created a knowledge gap that this study seeks to address.

Purpose of the Study

The general purpose of the study is to investigate perceived impact of artificial intelligence on effective learning in tertiary institutions in South-East Nigeria. Specifically, the study aimed to:

1. identifies areas of AI application in tertiary institutions in South East Nigeria
2. determines perceived impact of AI on tertiary institutions in South East Nigeria

Research Questions

The following research questions guided the study

1. What are the areas of application of AI in tertiary institutions in South East Nigeria?
2. What are the perceived impacts of AI on tertiary institutions in South East Nigeria?

Hypothesis

The following hypothesis was formulated to guide the study and was tested at 0.05 level of significance.

Ho_1: There is no significance difference between male and female computer students on perceived impact of artificial intelligence on effective learning in tertiary institutions in South-East Nigeria

Methodology

This study adopted a descriptive survey research design. The choice of this design was considered appropriate because it enabled the researcher to collect, analyze, and interpret data regarding the perceptions of computer students on the perceived impact of artificial intelligence on effective learning without manipulating any variables. The area of the study comprised tertiary institutions located in South-East Nigeria, specifically the University of Nigeria, Nsukka (UNN), and Nnamdi Azikiwe University, Awka (NAU). These institutions were purposively selected due to their advanced engagement with technology and the integration of artificial intelligence tools in their teaching and learning processes. The population for the study consisted of 620 computer students, comprising 350 male and 270 female undergraduates. These students were purposively selected based on their academic background and exposure to artificial intelligence applications in learning environments, which are central to the focus of the study. This sampling approach ensured that the selected participants possessed relevant experience and knowledge needed to provide informed responses to the research instrument. Data for the study were collected using a researcher-designed instrument titled *Perceived Impact of Artificial Intelligence for Effective Learning in Tertiary Institutions Questionnaire (PIAETQ)*. The questionnaire was structured into two main sections. Section I collected demographic information of the respondents such as gender and institutional affiliation. Section II contained 16 items divided into two thematic clusters. Cluster A focused on students' perceptions of the impact of artificial intelligence on effective learning, while Cluster B examined the challenges and limitations associated with the use of artificial intelligence in academic settings. The items were structured on a four-point Likert-type scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The instrument underwent both face and content validation. Three experts were engaged in the validation process—two from the Department of Educational Foundations and one from the Department of Science Education, all within the Faculty of Education, University of Nigeria, Nsukka. These experts reviewed the instrument to ensure that the items were clear, relevant, and aligned with the study objectives. To ascertain the reliability of the instrument, the Cronbach Alpha method was used, yielding an internal consistency coefficient of 0.78, which was considered acceptable for the study. Administration of the questionnaire was conducted in person across the two selected universities. Respondents were given adequate time to complete the questionnaires, and the completed instruments were retrieved immediately after completion to ensure a high response rate. Data collected were analyzed using both descriptive and inferential statistics. Specifically, mean and standard deviation were used to answer the research questions, while a t-test statistical analysis was applied to test the hypothesis at a 0.05 level of significance. A decision rule was adopted in interpreting the findings. For the research questions, a benchmark means score of 2.50 was used. Items with

mean scores of 2.50 and above were interpreted as agreement with the statements, while those below 2.50 indicated disagreement. For the hypothesis, the null hypothesis was rejected if the calculated t-value exceeded the critical t-value at the 0.05 level of significance. This approach provided a clear and objective basis for interpreting the data obtained from the study.

Results

Table 1: Mean responses and standard deviation of the computer students on the areas of application of AI in tertiary institutions in South East Nigeria?

N = 620

S/N	Item statement	$\bar{X}$	SD	Dec
1.	School administration,	3.23	0.71	Agree
2.	Mentainance of security	3.42	0.63	Agree
3.	School data management	3.14	0.86	Agree
4.	Teaching activities	3.24	0.84	Agree
5.	Learning activities	2.85	0.87	Agree
6.	The assessment and evaluation	3.05	0.89	Agree
7.	Research studies	3.28	0.80	Agree
8.	School surveillance	3.17	0.73	Agree
	Grand mean	3.26	0.83	Agree

Data I table 1 above shows the responses male and female computer students on the areas of application of AI in tertiary institutions in South-East Nigeria. The table reveals that all the items 1-8 are areas of application of AI in tertiary institutions and had their mean scores above the criterion mean of 2.50.This implies that the respondents are in agreement that all the listed items are areas of AI applications in tertiary institutions in South-East Nigeria. The above was supported by their grand mean score which is 3.26.

Table 2: Mean responses and standard deviation of the male and female computer on the perceived impact of AI in tertiary institutions in South East Nigeria

N = 620

S/N	Item statements	$\bar{X}$	SD	Dec
9.	AI Enhances students learning activities	3.40	0.72	Agree
10.	It encourages effective assessment of students	3.14	0.82	Agree
11.	It promotes availability of learning resources	3.33	0.73	Agree
12.	It promotes research studies	3.10	0.86	Agree
13.	It enhances school administration	3.35	0.69	Agree
14.	It encourages proper security in schools	3.03	0.88	Aree
15.	It promotes surveillance of schools	3.80	0.97	Agree
16.	It school data management	2.98	0.61	Agree
	Grand mean	3.25	0.74	Agree

The data on table 2 above show that the mean responses and standard deviation of the male and female computer students on the perceived impact of AI in tertiary institutions in South East Nigeria had their mean scores above the criterion mean of 250 for acceptance of an item as an agreement. This implies that male and female computer students are in agreement that items 9-16 above are the perceived impact of AI in teritiary institutions in South East Nigeria.

Hypothesis: 1

Ho_1: There is no significance difference between male and female computer students on perceived impact of artificial intelligence on effective learning in tertiary institutions in South-East Nigeria

Table 2: t-test analysis of the responses of male and female computer students on the areas of application of AI in tertiary institutions in South East Nigeria

S/N	Group	N	$\bar{X}$	SD	df	t-cal	Level of sign	Dec
1	Males	350	3.20	0.71	618	.000	0.05	Accept
2	Females	270	3.26	0.66				(NS)

Table 1 shows that the calculated t-value of .000 is less than 0.05 level at 618 degree of freedom. Since the p-value of 0.05 is greater than the calculated t-value of .000, the null hypothesis of no significant difference between male and female computer students is accepted. This implies that both male and female computer students did not differ in their opinions on the areas of application of AI in in tertiary institutions in South-East Nigeria.

Discussion

The findings of this study revealed that artificial intelligence (AI) are perceived as a transformative tool in various domains of tertiary education management and delivery in South-East Nigeria. Specifically, the study identified key areas of AI application including school administration, maintenance of security, school data management, teaching activities, and learning activities. Additional domains where AI is perceived to play a significant role include assessment and evaluation, research facilitation, and school surveillance. These findings reflect an emerging consensus in the literature regarding the expansive role of AI in advancing the quality and effectiveness of higher education. This result is consistent with the findings of Nwaokugha and Abiakwu (2024), who reported that AI significantly enhances instructional processes, student assessment, and the provision of institutional resources. In alignment with this, Agarry, Omolafe, Animashaun, and Babalola (2022) observed that AI tools have a positive influence on learners' academic engagement and outcomes in school settings. The implication is that AI's integration into the educational system enhances the delivery of curriculum content, ensures personalized learning experiences, and optimizes administrative efficiency.

Further analysis of the findings revealed that AI contributes meaningfully to the promotion of effective assessment strategies, facilitates the availability of instructional materials, encourages academic research, and strengthens institutional management. Notably, AI is also perceived to enhance school security through intelligent surveillance systems and data-driven threat detection, while improving the overall administration through robust data management systems. These perceptions mirror those reported by Ajadi, Salawu, and Adeoye (2008), who emphasized the potential of AI in improving both teaching and research activities in Nigerian tertiary institutions. Similarly, Oyediran, Omoare, Owoyemi, Adejobi, and Fasasi (2020) supported the view that AI contributes significantly to educational management by promoting enhanced learning environments, supporting administrative efficiency, streamlining student evaluation processes, and advancing research capabilities within institutions. Collectively, these studies reinforce the evidence from the present study, highlighting AI's multifaceted benefits across academic, administrative, and infrastructural components of higher education. However, despite the growing interest and adoption of AI in education, the findings point to a critical gap in empirical studies that explore AI's impact in the Nigerian context, especially from a gender-based perspective and within the specific

socio-cultural and infrastructural realities of South-East Nigeria. This underscores the importance of continued research to fully understand the contextual factors shaping the effective implementation and acceptance of AI in tertiary education.

Conclusion

Based on the findings of this study, it is concluded that tertiary institutions in South-East Nigeria are increasingly adopting artificial intelligence (AI) across multiple domains of academic and administrative operations. The study revealed that AI is perceived to significantly enhance learning effectiveness through improved teaching methods, personalized learning experiences, and streamlined assessment processes. Furthermore, AI supports efficient school administration, facilitates data management, promotes research activities, and strengthens institutional security and surveillance. These perceived impacts benefit not only the institutions but also lecturers and students, contributing to the overall advancement of educational quality and institutional performance. The findings underscore the transformative potential of AI in shaping a more responsive, data-driven, and effective learning environment in Nigerian higher education.

Recommendations

Based on the findings, the following recommendations were made:

1. Tertiary institutions should formulate and implement policies that guide the integration of AI technologies into teaching, learning, assessment, and administration to ensure sustainable and effective application across departments.
2. Continuous capacity building of both lecturers and students should be prioritized through workshops, seminars, and training sessions aimed at enhancing competence in the theoretical and practical application of AI in education.
3. Government and institutional management should invest in digital infrastructure, including high-speed internet access, AI-enabled learning management systems, and computing equipment to support AI-driven educational practices.
4. Universities should establish research hubs focused on artificial intelligence innovations in education to foster interdisciplinary collaboration, drive local solutions, and support educational transformation through AI.

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