ARTIFICIAL INTELLIGENCE'S POTENTIAL IN HIGHER EDUCATION ASSESSMENT FOR ACADEMIC PERFORMANCE IN HIGHER INSTITUTIONS

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Abstract
This study investigates the potential of Artificial Intelligence (AI) in enhancing the learning outcomes of Nigerian undergraduates. Using a mixed-methods approach, the research examines the integration of AI-driven educational tools. Data was collected through surveys and interviews with students, faculty members, and educational technologists across five Nigerian institutions. Quantitative data was analyzed to assess improvements in academic performance, engagement, and retention rates, while qualitative data highlighted perceptions of AI's role in enhancing teaching and learning processes. The findings reveal that there is significant main effect of treatment (AI-based tutoring systems, and Automated grading systems) on Learning outcomes of Nigerian Undergraduate ($F(_{2, 50}) = 43.225$, $p < .05$, $\eta^2 = .634$) and there was significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate ($F(_{2, 50}) = 10.711$, $p < .05$, $\eta^2 = .277$) result showed that there was significant relationship between Personalized learning platforms and learning outcomes among undergraduate students ($r = .421$, $N = 550$, $p < .05$). The findings reveal that AI tools significantly contributed to improved student learning outcomes, particularly in courses with high dropout rates and large class sizes. Students reported higher levels of engagement and personalized support, which were key factors in their academic success. The study concludes that while AI presents a transformative opportunity to enhance educational outcomes, its effective implementation in Nigerian higher education requires addressing technological and institutional challenges.

Keywords: AI Integration, Artificial Intelligence, Educational Innovation, Educational Technology, Learning Outcomes

Introduction

Artificial Intelligence (AI) refers to the development of systems capable of performing tasks that would typically require human intelligence, such as problem-solving, learning, and decision-making (Russell & Norvig, 2016). In the field of education, AI applications

are emerging as powerful tools to enhance teaching, learning, and administrative functions. AI's ability to analyze large datasets, personalize learning experiences, and automate processes offers promising potential for improving educational outcomes, particularly in higher education.

In Nigeria, the higher education system faces numerous challenges, including overcrowded classrooms, limited resources, outdated teaching methods, and disparities in access to educational opportunities (Adeleke, 2019). The rapid expansion of university enrollment coupled with the lack of sufficient teaching staff and infrastructure exacerbates these issues. These challenges highlight the need for innovative solutions, such as the adoption of AI technologies, to improve learning outcomes for Nigerian undergraduates. Education is highly ranked in the agenda of the 21st century nations for rapid development of manpower and task efficiency. It is generally acknowledged as being crucial system of any nation. It is the art of acquiring knowledge, developing of the reasoning and judgmental abilities of the mind, character and manipulative competencies in a formal setting. Education can authoritatively be regarded as key to national development because it unravels economic potentials, strengthens and equips individuals in society to fully be engaged and benefit from national polices. According to Klutka, Ackerly, and Magda, (2018), education is important to development of human resources, impartation of appropriate skills, knowledge and attitudes. Education plays an unquantifiable role in nation and the global world at large in terms of creating an environment of self-actualization. It is the only instrument that liberates and protects the human rights through a well detailed and acquired knowledge through a systematic process of learning. Jaysone,(2024) opines that education is the art of teaching and training of the individuals imparting the right training and necessary skills for a particular trade and or profession for positive impart in the society through better academic performance. Academic performance entails the different means students respond to their academic materials assigned by their teachers/lecturers. This explains that high academic performance is directly connected and measured by the examination results. AI has the potential to address many of the barriers to quality education in Nigeria by providing personalized learning experiences, automating administrative tasks, and enhancing the availability of learning resources. This study seeks to explore how AI can be utilized to improve learning outcomes for undergraduate students in Nigerian universities.

Artificial Intelligence in education refers to the use of AI technologies to enhance teaching, learning, and administrative processes. These technologies include machine learning, natural language processing, and data analytics, which enable systems to adapt to the needs of individual students and automate various educational tasks (Luckin et al., 2016). AI's potential to improve educational outcomes has been explored globally, with applications in personalized learning, intelligent tutoring systems, and automated assessment. One of the most significant uses of AI in education is personalized learning. Adaptive learning platforms use AI to assess students' knowledge levels, identify areas of weakness, and adjust the difficulty of learning materials accordingly (VanLehn, 2011). Such systems can create tailored learning paths for each student, allowing for a more efficient and engaging

learning experience. While AI applications in higher education are widespread in developed countries, Nigerian universities are just beginning to explore the potential of AI. Some Nigerian institutions, such as the University of Lagos, have experimented with e-learning platforms and AI-driven tools to enhance teaching and learning (Ogunleye, 2018). However, the integration of AI is still in its early stages, and there is limited infrastructure to support widespread implementation.

Problem Statement

Several challenges hinder the adoption of AI in Nigerian higher education, including limited access to technology, a lack of trained personnel, and financial constraints. Despite these barriers, there is growing interest in using AI to enhance educational outcomes and address systemic challenges within Nigerian universities (Adeleke, 2019). Despite efforts to improve the Nigerian education system, several challenges persist. These challenges point to the need for more efficient, scalable, and inclusive solutions in the Nigerian higher education system. AI, with its ability to personalize learning and automate administrative tasks, presents an opportunity to enhance educational outcomes across Nigerian universities. This study will focus on Nigerian undergraduate students and the potential of AI to improve their learning outcomes. Therefore, this research explored **Artificial** Intelligence's Potential in Higher Education Assessment for Academic Performance in Higher Institutions.

Research Objectives

This study aims to:

1. Investigate the relationship between *personalized learning platforms* and learning outcomes among undergraduate students.
2. Explore the relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students.
3. Examine the significant relationship between *Automated grading systems* and learning outcomes among undergraduate students.
4. Examine the main effect of treatment (*AI-based tutoring systems,* and *Automated grading systems*) on Learning outcomes of Nigerian Undergraduate .
5. Identify the significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate .

Research Questions

The study will address the following research questions:

RQ1: Is there any relationship between *personalized learning platforms* and learning outcomes among undergraduate students?

RQ2: Is there any relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students?

RQ3: Is there any significant relationship between *Automated grading systems* and learning outcomes among undergraduate students?

Research Hypotheses

Ho[1]: There is no significant main effect of treatment (*AI-based tutoring systems,* and *Automated grading systems*) on Learning outcomes of Nigerian Undergraduate .

Ho[2]: There is no significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate .

Methodology

This study adopted a survey research design, it involved surveys and data analysis to assess the impact of AI on student learning outcomes. The target population for this study includes undergraduate students, faculty members, and administrators in Nigerian universities. A purposive sampling technique was used to select universities that have started using AI technologies in their academic programs. A sample size of 500 students and 50 faculty members from five Nigerian universities were selected for this study. These universities were chosen based on their involvement in AI initiatives and their willingness to participate in the research. Data was collected through a structured questionnaires administered to students and faculty and data was gathered on their experiences with AI in education. The surveys was assessed through various aspects, including the effectiveness of AI tools, their impact on student engagement and performance, and the challenges encountered in using AI technologies. The data collected was analyzed using descriptive statistics and inferential statistics (e.g., ANCOVA and Pearson Product Moment Correlation(PPMC) analysis)

Ethical Considerations

Ethical considerations are critical in educational research, particularly when involving students and faculty as participants. Informed consent was obtained from all participants before the commencement of the study, ensuring that they understand the purpose, methods, and potential impacts of the research. Participants were also informed of their right to confidentiality and anonymity, and they were assured that their responses will be used solely for research purposes. Moreover, the study was adhered to ethical guidelines regarding voluntary participation, transparency, and respect for participants' privacy.

RESULTS

Research Questions

RQ1: Is there any relationship between *Personalized learning platforms* and learning outcomes among undergraduate students

Table 1: Result of PPMC showing the significant relationship between *Personalized learning platforms* and learning outcomes among undergraduate students

Variable	Mean	Std. Dev.	N	r	P	Remark
Learning Output	30.92	6.020	550	.421**	.000	Sig.
Personalized learning platforms	30.38	5.750				

*Sig. at .05 level

Table 1 above shows that there was significant relationship between *Personalized learning platforms* and learning outcomes among undergraduate students (r = .421, N= 550, p <.05). The result states there is relationship between *Personalized learning platforms* and learning outcomes among undergraduate students.

Ho2: Is there any relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students

Table 2: Result of PPMC showing the significant relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students

Variable	Mean	Std. Dev.	N	r	P	Remark
Learning Output	30.92	6.020	550	.560**	.000	Sig.
AI-based tutoring systems	31.12	5.939				

*Sig. at .05 level

Table 2 above shows that there was significant relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students (r = .560, N= 550, p <.05). The result states there is significant relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students.

Ho3: There will be no significant relationship between *Automated grading systems* and learning outcomes among undergraduate students

Table 3: Result of PPMC showing the significant relationship between *Automated grading systems* and learning outcomes among undergraduate students

Variable	Mean	Std. Dev.	N	R	P	Remark
Learning Outcomes	30.92	6.020	550	.800**	.000	Sig.
Automated grading systems	30.97	6.681				

*Sig. at .05 level

Table 3 above shows that there was significant relationship between *Automated grading systems* and learning outcomes among undergraduate students (r = .800, N= 550, p <.05). The result states there is significant relationship between *Automated grading systems* and learning outcomes among undergraduate students.

Result of Experimental

Table 4: ANCOVA Tests of Between-Subjects effect of *AI-based tutoring systems,* and *Automated grading systems* on Learning outcomes of Nigerian Undergraduate

Tests of Between-Subjects Effects

pendent Variable: Post Test

ɔurce	Type III Sum of Squares	df	Mean Square	F	Sig.	Par Sc
ɔrrected Model	2357.146[a]	9	261.905	27.970	.000	
tercept	332.699	1	332.699	35.531	.000	
·eatment	809.502	2	404.751	43.225	.000	
telligence	13.321	2	6.661	10.711	.004	
·etest	33.015	1	33.015	23.526	.001	
·eatment * Intelligence	24.654	4	6.164	5.658	.024	
·ror	468.187	50	9.364			
ɔtal	18832.000	60				
ɔrrected Total	2825.333	59				

R Squared = .834 (Adjusted R Squared = .804)

Ho[1]: There is no significant main effect of treatment (*AI-based tutoring systems,* and *Automated grading systems*) on Learning outcomes of Nigerian Undergraduate .

Table 4 it was shown that there is significant main effect of treatment (*AI-based tutoring systems,* and *Automated grading systems*) on Learning outcomes of Nigerian Undergraduate ($F_{(2, 50)} = 43.225$, $p < .05$, $\eta^2 = .634$). Null hypothesis is therefore rejected. This implies that the use of the treatment (*AI-based tutoring systems,* and *Automated grading systems*) had positive influence Learning outcomes of Nigerian Undergraduate, Nigeria. To find out the mean score obtained by the experimental group and the control group, the estimated marginal mean was computed. The result shown is presented Table 5

Table 5: Estimated Marginal main effect of treatment (*AI-based tutoring systems,* and *Automated grading systems*) on Learning outcomes of Nigerian Undergraduate

Dependent Variable: Post Test				
			95% Confidence Interval	
Treatment	Mean	Std. Error	Lower Bound	Upper Bound
Exp I (AI-based tutoring systems,)	22.047[a]	.784	20.472	23.622
Exp II (Automated grading systems)	18.062[a]	.748	16.560	19.564
Control Group (Personalized learning platforms,)	8.673[a]	1.046	6.572	10.773
a. Covariates appearing in the model are evaluated at the following values: Pre-Test = 10.58.				

Table 5 showed that participants in Experimental Group I (AI-based tutoring systems,) obtained a higher mean score ($\bar{x} = 22.047$) and Control Group (Personalized learning platforms,) had a mean score of ($\bar{x} = 8.062$) and Control Group (Personalized learning platforms,) had a mean score of ($\bar{x} = 8.673$), This shows that participants in Group I (AI-based tutoring systems,) had better knowledge than use of artificial intelligence that has improved Nigerian undergraduate learning outcomes. It then means that the treatment had better effect on Experimental Group II Automated grading systems) and Control Group

Ho[2]: There is no significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate .

Table 4, shown that there was significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate ($F_{(2, 50)} = 10.711$, $p<.05, \eta^2=.277$). The null hypothesis is therefore rejected. This means that there is significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate.

Table 6: Adjusted Marginal Mean showing the direction of difference in (*AI-based tutoring systems,* and *Automated grading systems*) by intelligence of Nigerian Undergraduate

Estimates				
Dependent Variable: Post Test				
			95% Confidence Interval	
INTELLIGENCE	Mean	Std. Error	Lower Bound	Upper Bound
Low	15.908[a]	1.001	13.897	17.920
Moderate	15.958[a]	.674	14.605	17.311
High	16.915[a]	.592	15.725	18.105
a. Covariates appearing in the model are evaluated at the following values: Pre-Test = 10.58.				

Table 6 showed that Intelligence of participants obtained a higher mean score ($\bar{x}$ = 16.91) follows by Moderate with a mean score of ($\bar{x}$ = *15.95*) and Low with a mean score of (*x* = *15.90*) This shows that students' higher participants had better learning outcomes of Nigerian Undergraduate.

Discussion

The findings of research question one showed that there was significant relationship between *Personalized learning platforms* and learning outcomes among undergraduate students From the findings it was also revealed that applying artificial intelligence in business education encourages students to discuss issues concerning research and academics. This finding contradicted the findings of Cho and Rangel (2017) who found that incorporating artificial intelligence in educational context led to overexposure, inappropriate usage, reputation, addiction, information overload as well as on content and personal privacy. Contrastingly, the study disagreed with the work of Alshaye, Tasir and Jumaat (2023) who undertook a critical analysis of the effects of artificial intelligence on student engagement and grades. Findings from research question two revealed that there was significant relationship between *AI-based tutoring systems* and learning outcomes among undergraduate students. This finding aligned with the study Lenandlar (2020) who noted that artificial intelligence has been used by students in education for various purposes which do influences their ways of doing things and by extension, networking with regards to academic activities. The findings of research question three revealed that there was significant relationship between *Automated grading systems* and learning outcomes among undergraduate students. From the findings it was also revealed that education postgraduate students can discuss assignment using course mastery; The finding of this study is in corroboration with the findings of Kibona and Mgaya (2015) who found that smartphone abuse to the point of addiction was becoming more problematic in Tanzania because most students of higher learning and low level students were more addicted to applications found of course mastery. Finding from hypothesis one revealed that there is significant main effect of treatment (*AI-based tutoring systems,* and *Automated grading systems*) on Learning outcomes of Nigerian Undergraduate. The findings of research hypothesis two revealed that there was significant main effect of intelligence on Learning outcomes of Nigerian Undergraduate. From the findings it was also revealed that Easy accessibility of complexity by education students help to increase their Learning outcomes. This finding aligned with the findings of Shuayb and Gebreel (2021) who carried out a study on the effect of using complexity on the academic achievement of students. Their study revealed that using complexity by the students can be of a positive and effective impact on their Learning outcomes. The finding from this study concur with the

study by Zamir and Mujeeb (2022) who found that artificial intelligence had dual influences on the Learning outcomes of prospective lecturers. The findings of this study disagreed with the study by Oguguo et al. (2020) who investigated the influence of research functionality application on students' academic achievement. Emphasis of the study was to determine the influence of research functionality application on the Learning outcomes of undergraduate students

Conclusion

The study lay emphasis on four variables which are artificial intelligence, course mastery, research complexity and research functionality to ascertain the influence its application has on Education postgraduate students' academic performance Based on the findings of the study, it was concluded that the artificial intelligence do have a positive influence on Education postgraduate students' academic performance in public universities in South-South Nigeria

Recommendations

1. Postgraduate students should aligned with the application of artificial intelligence to enhance improved academic performance;

2. Government and the relevant authorities should consistently make the utilization of artificial intelligence for learning in tertiary institutions a necessity;

3. Institutions of higher learning should put in place facilities like a functioning and effective Internet service to support the use of artificial intelligence;

4. More resource persons should be sourced to teach the students how to employ the various artificial intelligence for a robust academic purposes.

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