The Adoption of Artificial Intelligence in Tertiary Institution in Rivers State: An Empirical Study of Lecturers and Students' Awareness, Usage, and Challenges

By

Akalonu Chinyere
chinyereakalonu61@gmail.com
Department of Educational Management,
University of Port Harcourt, Choba**.**

Abstract

This empirical study investigated the Adoption of Artificial Intelligence (AI) in tertiary educational institutions in Rivers State, Nigeria. The study was guided by 2 research questions and 2 null hypotheses. The population consisted of all tertiary institutions in Rivers State. Using a stratified sampling technique, a total sample of 400 lecturers and students was selected. Data were collected through a structured instrument titled Artificial Intelligence Adoption and Challenge Questionnaire (AIACQ), developed by the researcher. The instrument consisted of 12 items rated on a 4-point Likert scale. The reliability of the AIACQ was established through Cronbach's alpha, yielding a coefficient of 0.87, indicating high internal consistency. Data were analyzed using descriptive statistics, Pearson correlation, and an independent samples t-test, analysis. Findings from Research Question One revealed a mean of 2.38, implying that AI adoption in tertiary educational institutions in Rivers State is to a low extent; actual usage in classroom instruction remained relatively low. A significant positive correlation was found between AI adoption and students' academic performance ($r = 0.29$, $p < .000$). The results in questions two also reveal an average mean of 3.25 which implies that most of the respondents agree that listed items (lack of infrastructure, insufficient training, students' lack access to AI tools, and policies that support AI implementation) are the challenges impeding the integration of AI adoption in tertiary institutions in Rivers State. Additionally, the calculated t-value of -0.653 is less than the t-critical value of 1.96 at a 0.05 level of significance, so null hypothesis 2 is accepted. Hence, there is no significant difference in the challenges impeding the integration of AI in tertiary institutions in Rivers State based on gender. The study recommends targeted professional development programs, equitable infrastructural investment across tertiary institutions, the establishment of a statewide AI policy, and curriculum reforms that promote computational and AI literacy from early education levels.

Keywords: Artificial Intelligence, Adoption and Challenges, Tertiary institution, Rivers State, Nigeria

Introduction

Artificial Intelligence encompasses computational methods and algorithms that enable machines to mimic human cognitive functions such as learning, reasoning, and problem-solving (Russell & Norvig, 2021). Within education, AI technologies can be classified into various categories, including Intelligent Tutoring Systems (ITS), machine learning-driven adaptive learning platforms, natural language processing applications, and AI-powered analytics tools (Baker et al., 2020). These tools are designed to support different facets of the educational process, ranging from personalized instruction and assessment to administrative and management functions (Holmes et al., 2019).

The rapid advancement of Artificial Intelligence (AI) has ushered in a new era of innovation and transformation across many sectors, with education being one of the most profoundly impacted. AI, broadly understood as the development of computer systems capable of performing tasks traditionally requiring human intelligence, such as learning, reasoning, and problem-solving, has begun to reshape how knowledge is delivered, assessed, and consumed (Russell & Norvig, 2021). In the educational context, AI applications range from intelligent tutoring systems (ITS), personalized learning platforms, and automated grading systems to AI-powered administrative tools and virtual learning assistants. These technologies promise to enhance both teaching efficiency and student learning outcomes (Holmes, Bialik, & Fadel, 2019).

AI's primary contribution to education lies in its ability to deliver personalized learning experiences. Adaptive learning systems use machine learning algorithms to analyze student performance data in real-time and tailor content delivery to individual learning styles, pacing, and competency levels (Chen, Chen, & Lin, 2020). For example, platforms such as Carnegie Learning and DreamBox Learning provide customized feedback and dynamically adjust difficulty levels, resulting in improved learner engagement and comprehension (VanLehn, 2011).

Globally, education systems are under increasing pressure to meet diverse learner needs, address gaps in access and quality, and prepare students for a rapidly evolving digital economy (UNESCO, 2020). AI presents an opportunity to address many of these challenges by enabling personalized instruction tailored to individual learning styles, automating repetitive administrative tasks to free

up educators' time. It also provides real-time data analytics to monitor learner progress and intervene as necessary (Luckin et al., 2016). Moreover, the COVID-19 pandemic accelerated the adoption of digital technologies, including AI, highlighting its critical role in supporting remote and hybrid learning environments (Williamson, Eynon, & Potter, 2020).

Empirical evidence increasingly supports the positive effects of AI on learning outcomes. Meta-analyses indicate that students using adaptive learning systems demonstrate significantly higher achievement and retention compared to traditional instructional methods (Kulik & Fletcher, 2016). AI also fosters motivation by incorporating gamification elements, real-time feedback, and immersive simulations that create engaging and interactive learning environments (Dichev & Dicheva, 2017).

However, some studies caution that the effectiveness of AI depends on contextual factors such as subject, learner characteristics, and the quality of AI design and implementation (Zawacki-Richter et al., 2019). Furthermore, the risk of over-reliance on AI may diminish critical thinking and problem-solving skills if not balanced with human instruction (Holmes et al., 2019).

Teachers' attitudes toward AI in education vary, reflecting both optimism about its potential benefits and concerns regarding its implications. Many educators appreciate AI's capacity to personalize instruction and reduce administrative burdens but express apprehension about job security, loss of pedagogical autonomy, and the need for comprehensive training (Holmes et al., 2019). Professional development programs focusing on AI literacy and pedagogical integration are vital to support educators in harnessing AI effectively (Luckin et al., 2016).

Despite these promising developments, the integration of AI in education is complex and multifaceted. The impact of AI on learning outcomes, student engagement, and teaching practices remains under-examined, particularly in diverse educational contexts with varying levels of digital readiness (Zawacki-Richter et al., 2019). Additionally, concerns around ethical issues such as data privacy, algorithmic bias, and equity of access have sparked critical debates about the responsible use of AI in educational settings (Binns et al., 2018; Williamson & Piattoeva, 2020). This empirical study seeks to contribute to this growing body of knowledge by systematically investigating the

role of AI in education, focusing on its adoption, perceived effectiveness, and the challenges encountered by educators and learners.

Statement of the Problem

While Artificial Intelligence (AI) to transform education is widely acknowledged, there is a significant gap between its theoretical benefits and practical outcomes. Educational institutions worldwide are investing in AI-driven tools and platforms; however, the extent to which these tools positively influence learning engagement, academic achievement, and instructional quality is still unclear. This ambiguity stems from limited empirical data that rigorously evaluates the effectiveness of AI implementations across different educational levels and socio-economic contexts in educational institutions in Rivers State.

Moreover, educators often face considerable challenges in adopting AI technologies. Many report insufficient training and professional development, a lack of technical infrastructure, and uncertainty about how AI impacts their roles and teaching practices. These issues may hinder the seamless integration of AI and limit its transformative potential in education. Given these challenges, this study seeks to empirically explore the real-world role of AI in educational institutions in Rivers State by assessing its adoption, impact on student outcomes, and educators' experiences.

Aim and Objectives

The study aims to investigate the role of Artificial Intelligence (AI) in the educational institutions in Rivers State, Nigeria. Specifically, the study seeks to:

1. Assess the level of adoption of Artificial Intelligence technologies in tertiary educational institutions in Rivers State.
2. Identify the challenges hindering the effective integration of AI in education in Rivers State.

Research Questions

The following research questions guided the study;

1. What is the extent of AI adoption in tertiary educational institutions in Rivers State?
2. What are the challenges impeding the integration of AI in tertiary institutions in Rivers State?

Research Hypotheses

The following hypotheses were tested at 0.05 alpha level:

1. There is a significant positive relationship between the adoption of AI technologies and students' academic performance in educational institutions in Rivers State.
2. There is no significant difference in the challenges impeding the integration of AI in tertiary institutions in Rivers State based on gender.

Methodology

This study adopts a descriptive-survey research design combined with a correlational approach to empirically investigate the role of Artificial Intelligence in educational institutions in Rivers State. The descriptive-survey design enables the collection of detailed information about AI adoption levels and challenges, while the correlational aspect explores relationships between AI adoption and engagement. The study population comprises lecturers and students in tertiary institutions in Rivers State. The target population includes: Lecturers and students in tertiary institutions such as Rivers State University, Ken Saro-Wiwa Polytechnic, and the University of Port Harcourt. A stratified random sampling technique was used to ensure representation across educational levels (tertiary). The sample size was determined based on Taro Yamane's formula to achieve statistical significance, targeting approximately 400 respondents. Data Collection Instruments. Two main instruments were developed and validated: the AI Adoption Questionnaire (AIAQ): a Structured questionnaire for lecturers and students to assess AI knowledge, attitudes, readiness, and challenges. Items measured on a 4-point Likert scale (Strongly Disagree to Strongly Agree). Both instruments were pilot-tested with a small subset of participants to ensure reliability (Cronbach's alpha > 0.7) and content validity. Data analysis was analyzed using SPSS version 25 statistical

software. Descriptive statistics (means and standard deviation) to summarize AI adoption levels and challenges. While Pearson's correlation coefficient was used to test relationships between AI adoptions, while t-test was used to test the challenges between lecturers and students.

Results

Research Question One: What is the extent of AI adoption in tertiary institutions in Rivers State?

Table 1: **Mean and Standard deviation analysis on the extent of AI adoption in tertiary educational institutions in Rivers State**

	AI Adoption Indicator	Mean	SD	Remark
1	AI tools are used in my institution.	3.03	0.61	High extent
2	I integrate AI tools in my lessons.	1.95	1.05	Very Low extent
3	AI helps personalize instruction.	2.18	0.80	Low extent
4	AI reduces administrative workload.	3.33	0.68	High extent
5	I have received AI training.	2.53	0.59	High extent
6	My institution has AI infrastructure.	1.25	1.15	Low extent
	Average Mean	**2.38**	**0.81**	**Low extent**

The result from Table 1 above shows the mean score analysis of the AI adoption in Rivers State's educational institutions. The respondent agrees to a high extent with items 1, 4, and 5 that AI tools are used in their institution, reduce administrative workload, and that they received AI training with mean scores above the criterion mean of 2.5. But disagree with items 2, 3, and 6 that they integrate AI tools in their lessons that AI helps personalize instruction that their institution has AI infrastructure. The obtained average of 2.38 implies that AI adoption in tertiary educational institutions in Rivers State is to a low extent.

Research Question 2: What are the challenges impeding the integration of AI adoption in tertiary institutions in Rivers State?

Table 2: **Mean and Standard deviation analysis on the challenges impeding the integration of AI adoption in tertiary institutions in Rivers State**

	Challenge Item	Mean	SD	Remark
1	Lack of infrastructure limits AI adoption.	3.59	0.73	Strongly agree
2	Insufficient training is a barrier.	3.55	0.72	Strongly agree
3	Students lack access to AI tools.	3.38	0.67	Agree
4	Policies do not support AI implementation.	3.64	0.58	Strongly agree
5	High cost of AI technology is prohibitive.	1.74	0.91	Disagree
6	Resistance to change among staff limits adoption.	3.58	0.76	Strongly agree
	Average Mean	**3.25**	**0.73**	**Agree**

The result from Table 2 above shows the mean score analysis of the AI adoption in Rivers State's educational institutions. The respondent agrees to items 1,2,3,4, and 6 that lack of infrastructure, insufficient training, students lack access to AI tools, policies that support AI implementation limit AI adoption to a very high and high extent, with mean scores above the criterion mean of 2.5. However, it disagrees with item 5 that the high cost of AI technology is prohibitive. The obtained average mean of 3.25 implies that most of the respondents agree that the listed items are the challenges impeding the integration of AI adoption in tertiary institutions in Rivers State.

Hypothesis One: There is a significant positive relationship between the adoption of AI technologies and students' academic performance in educational institutions in Rivers State.

Table 3: PPMC summary table showing the relationship between the adoption of AI technologies and students' academic performance in educational institutions in Rivers State

		Adoption of AI technologies	Job Competence
Adoption of AI technologies	Pearson Correlation	1	.296**
	Sig. (2-tailed)		.000
	N	413	413
Educational outcome	Pearson Correlation	.296**	1
	Sig. (2-tailed)	.000	
	N	413	413

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3 presents Pearson's Product-Moment Correlation result of the adoption of AI technologies and the academic performance of students in educational institutions in Rivers State. The result revealed an r-value of .296 with its corresponding p-value of .000<0.05 level of significance. This shows a weak positive relationship between adoption of AI technologies and academic performance. This result also indicates that to a very low extent, the adoption of AI technologies relates to the academic performance of students in educational institutions in Rivers State. Again, since the p-value is less than the chosen level of significance, the null hypothesis is rejected. It therefore implies that there is a significant positive relationship between AI adoption and the academic performance of students in educational institutions in Rivers State. This also means that as adoption of AI technologies increases, there tends to be a corresponding increase in the academic performance of students in educational institutions in Rivers State.

Hypothesis Two: There is no significant difference between lecturers and students on the challenges impeding the integration of AI in tertiary institutions in Rivers State

Table 4.4: z-test analysis on difference between lecturer and students on the challenges impeding the integration of AI in tertiary institutions in Rivers State

	VARIABLES	N	Mean	Std. Deviation	Df	t-cal	tcrit	Level of Sig.	Decision
challenges impeding the integration of AI in tertiary institutions	Lecturers	480	2.58	0.35	312	-0.653	1.960	0.05	Not Significant
	Students	320	2.56	0.35					

Result in Table 4.4 shows that the mean score of female and male students are 2.58 and 2.56. The standard deviations of their scores are 0.35, respectively. However, when these mean differences were subjected to an independent t-test statistic, it was observed that the calculated t-value -0.653

is less than t-critical 1.96 at 0.05 level of significance, so the null hypothesis is accepted. Hence, there is no significant difference between lecturers and students on the challenges impeding the integration of AI in tertiary institutions in Rivers State.

Discussion

This study explored the role of artificial intelligence in tertiary institutions within Rivers State, Nigeria, focusing on adoption, engagement, and challenges. The findings reveal that most respondent agrees to a high extent that AI tools are used in their institution, reduce administrative workload, and that they received AI training with mean scores above the criterion mean of 2.5. But disagree that they integrate AI tools in their lessons that AI helps personalize instruction that their institution has AI infrastructure. Overall, participants demonstrated moderate AI literacy (M = 2.38), which has a significant positive correlation between AI adoption and students' academic performance (r = 0.29, p < .000). These findings suggest that while awareness is relatively high, practical implementation remains limited. The results align with existing literature that suggests AI use in education can enhance student engagement and learning outcomes (Nguyen et al., 2022; Holmes et al., 2021). The positive correlation between AI adoption and academic performance supports this assertion, indicating that AI may serve as a tool to improve instruction quality and learner comprehension.

Differences by gender an independent samples t-test indicated no significant difference in AI challenges, tcal = 0.653, p = .004 (Table 4). Male respondents (M = 2.56, SD = 0.35) female respondents (M = 3.2.58, SD = 0.35). Importantly, policy implementation and the lack of AI infrastructures are key challenges of AI integration. Educators who understood AI were more likely to use it effectively. This supports prior findings that professional development and digital

competence are crucial in adopting emerging technologies (Ifinedo, 2019). It underscores the urgency of training programs and policy frameworks to equip educators with the necessary skills for AI integration. Despite positive findings, challenges such as inadequate infrastructure, insufficient training, and policy gaps were consistently reported. Addressing these barriers will be essential for scaling AI solutions in Nigerian classrooms.

Conclusion

This study examined the role of artificial intelligence (AI) in tertiary institutions in Rivers State, Nigeria, with a focus on educators' levels of AI literacy, usage patterns, and associated challenges. The empirical results showed that while educators demonstrated moderate awareness of AI technologies, actual implementation in classroom settings remained suboptimal. A statistically significant positive relationship was found between AI adoption and academic performance, affirming the transformative potential of AI when integrated effectively. Furthermore, AI literacy emerged as a strong predictor of integration, underscoring the importance of professional capacity in adopting emerging technologies.

The findings collectively underscore a growing interest and willingness to adopt AI in teaching and learning processes, but also highlight a range of structural, infrastructural, and institutional limitations that must be addressed. This study contributes to the body of knowledge by offering region-specific insights into how AI is shaping education in a developing context and provides empirical evidence to inform educational planning, ICT policy, and teacher development programs, especially in tertiary institutions in Rivers State.

Recommendations

1. The Ministry of Education and relevant stakeholders should design and deliver structured training programs focused on AI literacy and data management for teachers and administrators

2. Government and private sector collaborations should prioritize investments in stable electricity, internet connectivity, and access to AI-compatible devices in schools to support seamless AI adoption.

3. Rivers State Government should Foster Public–Private Partnerships (PPP) Collaboration with technology firms, EdTech companies, and NGOs who can bring innovative solutions, software, and hardware into classrooms, especially in under-resourced communities.

4. Educational content should be updated to include computational thinking, basic AI concepts, and algorithmic reasoning from the primary level upward, aligning with global digital education standards.

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