SECONDARY SCHOOL TEACHERS' READINESS TO INTEGRATE ARTIFICIAL INTELLIGENCE INTO PEDAGOGICAL PRACTICE IN RURAL AREAS OF RIVER STATE

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Abstract
Artificial intelligence (AI) has the potential to address some of the most significant challenges in education today, particularly by innovating teaching and learning practices in rural areas. This study examined the readiness of teaching staff for the integration of artificial intelligence into pedagogical practices within Rivers State-owned secondary schools in rural areas. A descriptive correlational design was employed for the research. The study established three specific objectives, along with corresponding research questions and hypotheses. The population for this study comprised 8,041 teachers, including 3,548 from senior secondary schools and 4,493 from junior secondary schools in Rivers State's rural areas (Rivers State Senior Secondary Schools Board and Rivers State Universal Basic Education Board, 2025). The sample size of 374 respondents was determined using the Taro Yamane formula, selected through a multistage sampling technique. Data collection was conducted via a self-structured questionnaire titled "Teachers' Readiness towards Artificial Intelligence Integration for Pedagogical Practices." The instrument was validated by experts, and its reliability was assessed using Cronbach's alpha, yielding a coefficient of 0.86, indicating satisfactory reliability. Data were analyzed using mean and standard deviation, while the formulated hypotheses were tested with t-test statistics and Pearson Product-Moment Coefficient at a 0.05 level of significance. The findings revealed that respondents were aware of AI in education and expressed a high level of readiness to integrate AI tools into their pedagogical practices. Consequently, it is recommended that the government develop a national AI pedagogy framework for education and organize professional training and mentoring programs in AI technologies to enhance teachers' pedagogical application competencies.

Keywords: artificial intelligence, readiness, pedagogical practices, secondary school
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Introduction

Mechanization, automation, and technology have altered how we live and work since the Industrial Revolution. In this continuum of technological evolution, Artificial Intelligence (AI) has emerged as a transformative force that is revolutionizing many sectors, including education. AI is the development and capacity of machines to carry out human-like tasks, including voice and visual recognition, problem-solving, and decision-making. According to Verma (2018), artificial intelligence is the study of intelligent machines and software that have the capacity for perception, manipulation, learning, reasoning, communication, and knowledge gathering. Aina et al. (2023) opined that AI is a cutting-edge technical framework that encompasses the creation of computer systems that can perform tasks that typically need human intellect. In essence, AI systems are able to understand a variety of knowledge sources, including scholarly literature, and produce responses to text-based inputs that are human-like (Bhattacharya et al., 2023; Kitamura, 2023). These views indicate that AI is a machine-based system that is built around human-defined objectives in order to carry out tasks that would typically require the intelligence of humans. Thus,

AI is distinct from other forms of digital technologies as it can replicate human behaviour, including learning, reasoning, and decision-making.

Globally, AI appears to be integrated into education, and it is augmenting the teaching and learning processes. Intelligent tutoring systems, virtual simulations, and adaptive learning platforms are all examples of artificial intelligence uses in education. Limna et al. (2023) pointed out that significant progress has been made in the integration of AI in education since late 2022, and it is rapidly changing pedagogical approaches and the global learning landscape. However, this is posing a challenge to the conventional teaching methods. Accordingly, scholars have noted that artificial intelligence technologies in education can augment teachers' and students' teaching and learning experiences by offering creative content and personalized feedback (Chan & Lee, 2023; Okunade, 2024). Furthermore, artificial intelligence systems can support teaching and learning through text summarization, knowledge synthesis, and idea generation (Qasem, 2023). Also, artificial intelligence demonstrates promise in learning assessment by assessing students' written work and promptly providing comments (Crompton & Burke, 2023). Beyond its student-centric benefits, artificial intelligence (AI) is empowering teachers by helping them make the most of their time using AI-powered grading systems, which allow them to concentrate more on individualized instruction and real-time feedback (Nyakundi et al., 2024). Thus, AI in education could benefit teachers and the teaching process through personalized educational resources, particularly for at-risk or gifted students, learning predictive models, better classroom management, improved teaching across a range of subjects, and qualified development in pedagogical skills (Zhang & Aslan, 2021; Chiu et al., 2023). Also, artificial intelligence (AI) tools can provide access to educational experiences that were previously unavailable in rural areas, where students typically face resource limitations. In essence, the integration of AI into the teaching process may provide more efficient and accessible education, as well as tailored learning, better content delivery, and improved assessment.

This suggests that in the educational context, artificial intelligence (AI) can be seen as an educational partner, improving content and competencies to augment the learning process for comprehensive teaching and learning. Accordingly, artificial intelligence (AI) has the potential to completely transform both the professional and educational experiences of teachers and students, particularly in Nigeria’s rural areas, where the education sector faces many obstacles, like uneven access to learning resources and poor infrastructure. In agreement with this view, Okunade (2024) submitted that artificial intelligence’s potential in education can improve academic performance, reduce educational gaps, and prepare Nigerian students for the technology of the future. This indicates that artificial intelligence (AI) in education can greatly influence the comprehensive solution of problems such as overcrowded classrooms, insufficient funding, and unequal distribution of educational facilities in Nigeria that transcend geographical barriers. This opinion is consonant with UNESCO’s Global Education Monitoring Report (2023), that artificial intelligence can offer students, particularly those in rural areas. This suggests that artificial intelligence (AI) in education can enhance educational and learning opportunities in remote schools and broaden students' perspectives. Thus, the convergence of AI in education offers tremendous potential to address the challenges Nigeria faces in its educational system. Accordingly, stakeholders in Nigeria’s education sector have urged the Federal Government to include robotics and artificial intelligence (AI) into the country’s basic and secondary education curricula (Nja et al., 2023; Nwanguma & Onyeukwu, 2023). Nigeria has been considered an artificial intelligence (AI) champion on the African continent, being the first nation in the region to establish a National Centre for Artificial Intelligence and Robotics (NCAIR). The National

Agency for Research in Robotics and Artificial Intelligence (NARRAI) was established to support AI system research and development in Nigeria (Effoduh, 2021). The implication is that a revolution in the Nigerian education landscape is imminent.

While the potential of AI in education is immense, however, scholars have noted that the integration of artificial intelligence in education also presents challenges and ethical concerns. Academic integrity and plagiarism concerns were brought to light by Kumar (2023), who pointed out that AI-generated content can contain incorrect citations and a dearth of original viewpoints. There are also concerns about potential biases, errors, and the creation of damaging or deceptive content (Harrer, 2023). Similarly, in the opinion of Lubowitz (2023), relying too much on artificial intelligence tools might impair critical thinking abilities and lead to dependency, which may impede real learning. However, in spite of the challenges and obstacles related to artificial intelligence (AI) integration in education, it is imperative to acknowledge that there is an increasing recognition of the substantial influence artificial intelligence may have on education, particularly in Nigeria (Nguyen & Rasmussen, 2016; Okunade, 2024). Therefore, Nwile and Edo (2023) asserted that a teacher will not be able to keep up with the current educational revolution if they do not understand the use of artificial intelligence. In agreement with this assertion, the United Nations Educational, Scientific and Cultural Organization (2024) affirmed that proficiency in artificial intelligence (AI) is increasingly becoming a prerequisite for teaching positions. This emphasizes how a new age of educational innovation has been brought about by the use of artificial intelligence (AI) in education. The implication is that teachers should be aware of artificial intelligence (AI) technologies, but also know how to use them pedagogically as well as customize them to fit specific curriculum needs (Widodo & Hidayati, 2023). Thus, the main challenge is how knowledgeable teachers are in applying AI-driven technologies as a pedagogical instrument, particularly in rural areas.

Teachers serve as decision-makers regarding students' learning and classroom activities. Accordingly, teachers are anticipated to be the main users of artificial intelligence (AI) in education and to be the ones who develop and facilitate students' AI-assisted learning (United Nations Educational, Scientific and Cultural Organization, 2024). Therefore, teachers must adopt innovative change and include artificial intelligence (AI) into their pedagogical practices. Corroborating this assertion, Adeyemi (2020) and Bupo and Akpomi (2023) averred that a comprehensive use of AI in education will improve a pedagogical environment that is more responsive to student individualization and differentiated learning demands. However, Alshorman (2024) maintained that the realization of this objective depends on the awareness and readiness of teachers to integrate AI technology. Awareness refers to a teacher's knowledge and understanding of AI technologies, their capabilities, benefits and potential challenges. Thus, a higher level of awareness enables teachers to recognize the value of AI tools and consider their integration into teaching practices. Relatedly, readiness encompasses the teacher's skills, confidence and preparedness to implement AI effectively, including technical proficiency and pedagogical adaptability. The implication is that when teachers are aware of AI's potential and prepared to use it, they are more likely to incorporate AI tools to the benefit of their students. Though, over-reliance on AI could lead to the weaken of teachers' essential competencies (United Nations Educational, Scientific and Cultural Organization, 2024), Nja et al. (2023) and Mangione et al. (2024) has claimed that some teachers, particularly those in the rural areas will jettison a new method of teaching with new technologies due to their low professional quality and lack of digital literacy. Thus, it is expedient to have an insight into the readiness of teachers in rural secondary schools towards the integration of artificial intelligence for pedagogical practices.

Statement of the Problem

The redefining of education systems is increasingly focused on the integration of artificial intelligence (AI) technology in developed nations. AI has the potential to improve students' cognitive and learning capacities while improving the effectiveness of teaching methods through personalized learning experiences. With AI, students can access education from anywhere, benefiting from automated assessments, interactive discussions, and virtual classrooms. This suggests that AI can provide high-quality, comprehensive educational opportunities, particularly for students in underserved or rural areas.

However, despite the numerous educational potentials of AI, its integration into pedagogical practices remains limited in sub-Saharan African countries. According to Dhawan (2020), many educators in the region lack the necessary skills and knowledge to effectively implement AI technologies in their teaching. This concern is further illustrated by Nyakundi et al. (2024), which reports a digital literacy rate of just 31% and a digital non-readiness score of 56.6% for the region. In Nigeria specifically, the application of AI in the education sector remains relatively minimal. The intersection of AI and education has long been a catalyst for innovation, transforming traditional pedagogical approaches and ensuring that every child, regardless of geographical location, has access to quality education. Consequently, educators who are not equipped to leverage AI may inadvertently widen the digital divide and produce students lacking the skills necessary to thrive in the fourth industrial revolution. Therefore, this study aims to investigate the extent to which secondary school teachers in rural areas are aware of AI in education and their readiness to incorporate AI into their pedagogical practices.

Research Questions

The following research questions guided the study.

1. To what extent are teachers in Rivers State-owned secondary schools in rural areas aware of AI in education?
2. To what extent are teachers in Rivers State-owned secondary schools in rural areas ready to integrate AI for pedagogical practices?
3. What is the relationship between teachers in Rivers State-owned secondary schools in rural areas, awareness of AI in education and their readiness to integrate AI for pedagogical practices?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant difference in the mean response scores of teachers in Rivers State-owned senior and junior secondary schools in rural areas, on the extent of their awareness of AI in education.
2. There is no significant difference in the mean response scores of teachers in Rivers State-owned senior and junior secondary schools in rural areas, on the extent of their readiness to integrate AI for pedagogical practices.
3. There is no significant relationship in the mean response scores of teachers in Rivers State-owned secondary schools in rural areas, awareness of AI in education and their readiness to integrate AI for pedagogical practices.

Methodology

The study adopted a descriptive correlational design and focused on a population of 8,041 teachers, which comprises 3,548 senior secondary school teachers and 4,493 junior secondary school teachers in rural areas of Rivers State (Rivers State Senior Secondary Schools Board and Rivers State Universal Basic Education

Board, 2025). The sample size of 374 respondents was determined using the Taro Yamane formula. Due to the extensive geographical spread of the population, a multistage sampling technique was utilized to select the sample. Data were collected through a self-structured questionnaire titled "Teachers' Readiness towards Artificial Intelligence in Education Integration for Pedagogical Practices." The instrument was validated by experts, and the reliability was determined using Cronbach's alpha, yielding a coefficient of 0.86, which indicates that the instrument is reliable. The questionnaire included demographic information and 14 items aligned with the study's objectives. Responses were rated on a 4-point scale: High Extent (4 points), Moderate Extent (3 points), Low Extent (2 points), and Very Low Extent (1 point). The data collected were analyzed using mean and standard deviation, with a benchmark set at 2.50. Hypotheses were tested using a t-test and Pearson's Product-Moment Coefficient at 0.05 level of significance.

Results

Research Question 1: To what extent are teachers in Rivers State-owned secondary schools in rural areas aware of AI in education?

Table 1: *Mean response on the extent teachers in Rivers State-owned secondary schools in rural areas are aware of AI in education.*

S/N	Item	Senior Sec. School (N=179)			Junior Sec. School (N=195)		
		Mean	**SD**	**Rmk.**	**Mean**	**SD**	**Rmk.**
1.	I am familiar with artificial intelligence tools designed to help with schoolwork.	2.60	.96	HE	2.74	.89	HE
2.	I am aware that AI-based automated grading systems evaluate assignments and assessments swiftly and accurately.	3.07	.97	HE	3.03	.91	HE
3.	I am aware that artificial intelligence can support teachers working with students in remote areas.	2.56	1.04	HE	2.50	1.14	HE
4.	I am aware that artificial intelligence can be used to overcome boundaries of place and time to create immersive learning experiences.	2.91	.90	HE	2.81	.99	HE
5.	I am aware AI-driven algorithms scrutinize student performance patterns and behaviours, facilitating early detection of potential learning disabilities.	2.30	1.08	LE	2.29	.99	LE
6.	I am aware that artificial intelligence empowers teachers by optimizing their time through AI-powered grading systems, enabling a greater focus on personalized instruction and immediate feedback.	3.12	.79	HE	2.93	1.03	HE
7.	I am aware that Intelligent Tutoring Systems (ITS) cater for individual learning styles, particularly in underserved locations.	2.96	.93	HE	2.71	.94	HE
	Grand Mean	**2.79**		**HE**	**2.72**		**HE**

Data from Table 1 shows a grand mean value of 2.79 for senior secondary school teachers' awareness of AI in education and 2.72 for junior secondary school teachers. Both of these figures exceed the benchmark mean value of 2.50, suggesting that teachers in Rivers State-owned secondary schools in rural areas possess a considerable awareness of AI in education.

Research Question 2: To what extent are teachers in Rivers State-owned secondary schools in rural areas ready to integrate AI for pedagogical practices?

Table 2: *Mean response on the extent teachers in Rivers State-owned secondary schools in rural areas are ready to integrate AI for pedagogical practices.*

S/N	Item	Senior Sec. School (N=179)			Junior Sec. School (N=195)		
		Mean	**SD**	**Rmk.**	**Mean**	**SD**	**Rmk.**
1.	I understand the basic concepts of artificial intelligence relevant to education.	2.34	1.01	LE	2.33	1.04	LE
2.	I am confident in my ability to use artificial intelligence tools for teaching secondary school subjects.	2.80	.88	HE	2.64	1.04	HE
3.	I can easily learn new artificial intelligence tools that are introduced for educational purposes.	3.37	.72	HE	3.32	.77	HE
4.	I feel prepared to troubleshoot minor issues with artificial intelligence technology in the classroom.	2.46	.94	LE	2.53	.90	HE
5.	I can evaluate the effectiveness of artificial intelligence tools in enhancing learning.	2.51	1.21	HE	2.58	1.08	HE
6.	I am comfortable explaining the benefits and limitations of artificial intelligence to my students.	2.50	1.13	HE	2.49	1.04	LE
7.	I can integrate artificial intelligence teaching tools with traditional teaching methods effectively.	2.55	.92	HE	2.61	1.04	HE
	Grand Mean	**2.65**		**HE**	**2.64**		**HE**

Data from Table 2 reveals a grand mean value of 2.65 for the readiness of senior secondary school teachers in rural areas to integrate AI into pedagogical practices, and a mean value of 2.64 for junior secondary school teachers in the same context. Both values exceed the benchmark mean of 2.50, indicating that teachers in Rivers State-owned secondary schools in rural areas demonstrate a significant readiness to incorporate AI into their teaching practices.

Research Question 3: What is the relationship between teachers in Rivers State-owned secondary schools in rural areas, awareness of AI in education and their readiness to integrate AI for pedagogical practices?

Table 3: *PPMC analysis of teachers in Rivers State-owned secondary schools in rural areas, awareness of AI in education and their readiness to integrate AI for pedagogical practices*

Variable		Teachers' awareness of AI	Teachers' readiness to integrate AI
Teachers' awareness of AI	Pearson Correlation	1	.791**
	Sig. (2-tailed)		.000
	N	374	374
Teachers' readiness to integrate AI	Pearson Correlation	.791**	1
	Sig. (2-tailed)	.000	
	N	374	374

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

Table 3 shows the correlation between teachers in Rivers State-owned secondary schools in rural areas, awareness of AI in education and their readiness to integrate AI for pedagogical practices. The correlation coefficient (r = .791) indicates a strong positive relationship. This suggests that as teachers become more aware of AI technologies, their readiness to integrate these technologies into their teaching increases correspondingly.

Hypothesis Testing

Hypothesis 1: There is no significant difference in the mean response scores of teachers in Rivers State-owned senior and junior secondary schools in rural areas, on the extent of their awareness of AI in education.

Table 4: *t-test summary showing the differences in mean response scores on the extent of teachers in Rivers State-owned senior and junior secondary schools in rural areas' awareness of AI for pedagogical practices*

Variables	**N**	**Mean**	**SD**	**Df**	**t-cal.**	**t-crit**	**Decision**
Senior Sec. School	179	2.79	.72	372	1.03	1.96	**Accept**
Junior Sec. School	195	2.71	.67				

Table 4 shows the t-test comparing the awareness of AI in education among teachers in Rivers State-owned senior and junior secondary schools located in rural areas. The findings revealed that the t-calculated value (1.03) is lower than the t-critical value (1.96) at the 0.05 significance level with a degree of freedom of 372. Consequently, the hypothesis is accepted, suggesting that there is no significant difference in the mean response scores of teachers in Rivers State-owned senior and junior secondary schools in rural areas regarding their awareness of AI in education.

Hypothesis 2: There is no significant difference in the mean responses of teachers in Rivers State-owned senior and junior secondary schools in rural areas, on the extent of their readiness to integrate AI for pedagogical practices.

Table 5: *t-test results showing the differences in the mean responses on the extent of teachers in Rivers State-owned senior and junior secondary schools in rural areas' readiness to integrate AI for pedagogical practices*

Variables	N	Mean	SD	Df	t-cal	t-crit	Decision
Senior Sec. schools	179	2.63	.73	372	.03	1.96	**Accept**
Junior Sec. schools	195	2.64	.73				

Table 5 shows a summary of the t-test between teachers in Rivers State-owned senior and junior secondary schools in rural areas regarding their readiness to integrate AI into pedagogical practices. The result indicates that the t-calculated value (.03) is lower than the t-critical value (1.96) at the 0.05 significance level, with the given degree of freedom 372. Consequently, the hypothesis is accepted, suggesting that there is no significant difference in the mean response scores of teachers in Rivers State-owned senior and junior secondary schools in rural areas, in their readiness to integrate AI for pedagogical practices.

Hypothesis 3: There is no significant relationship between teachers in Rivers State-owned secondary schools in rural areas' awareness of AI in education and their readiness to integrate AI for pedagogical education and their readiness to integrate AI for pedagogical practices.

Table 6: *Correlation analysis of teachers in Rivers State-owned secondary schools in rural areas, awareness of AI in education and their readiness to integrate AI for pedagogical practices*

Variable		Teachers' awareness of AI	Teachers' readiness to integrate AI
Teachers' awareness of AI	Pearson Correlation	1	.791**
	Sig. (2-tailed)		.000
	N	374	374
Teachers' readiness to integrate AI	Pearson Correlation	.791**	1
	Sig. (2-tailed)	.000	
	N	374	374

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

Table 6 reveals an R-value of .791 and a p-value of .000, indicating a strong and positive correlation between the awareness of AI in education among teachers in Rivers State-owned secondary schools located in rural areas and their readiness to integrate AI into pedagogical practices. Consequently, the null hypothesis is rejected, and the alternative hypothesis is accepted. This suggests that there is a significant relationship between these teachers' awareness of AI in education and their preparedness to adopt AI for teaching purposes.

Discussion

The finding of the study reveals that teachers in Rivers State-owned secondary schools located in rural areas demonstrate a high level of awareness regarding artificial intelligence in education. This result aligns with the findings of Shanag and Ghalyoun (2023), who noted that teachers possess a significant awareness of AI in education. Furthermore, it agrees with Güneyli et al. (2024), who reported that teachers exhibit above-average awareness of AI, with practical knowledge. However, they also stated that translating this

awareness into educational practice remains a complex issue. The higher awareness of AI in education among teachers in rural secondary schools can be attributed to factors such as academic freedom. Also, the employment of graduates to teach at the secondary school level in Rivers State is significant to this awareness.

The study also revealed that teachers in Rivers State-owned secondary schools in rural areas are ready to integrate AI into their pedagogical practices. This finding is consistent with Ogoronte and Bupo (2024), who asserted that teachers are highly ready to integrate artificial intelligence to improve teaching effectiveness. According to Bezjak (2024), the readiness of teachers to use technology is a key factor in technology integration. In line with this, Fakhar et al. (2024) noted that teachers are motivated to integrate AI into their teaching practices, as it proves beneficial in providing pedagogical materials and fostering an ideal learning environment that simplifies their jobs.

The findings also revealed a strong positive relationship between the awareness of artificial intelligence (AI) in education among teachers in Rivers State-owned secondary schools in rural areas and their readiness to integrate AI into pedagogical practices. This aligns with the findings of Alnasib (2023), which indicate that teachers who have a positive awareness of AI are more likely to incorporate it into their teaching methodologies. Additionally, it corresponds with Bezjak (2024), who found that many teachers require further practical knowledge on utilizing AI tools before they can integrate these technologies more comprehensively into their teaching. This highlights the perspective of Bautista et al. (2024), who assert that increased usage of AI in the classroom will familiarize teachers with its applications. Consequently, this suggests that initiatives aimed at enhancing teachers' awareness of AI technologies may significantly improve their readiness to adopt and implement AI tools and resources in their pedagogical practices.

Conclusion

Based on the findings of the study, it is concluded that teachers in Rivers State-owned secondary schools in rural areas are aware of AI in education and ready to integrate AI tools into their pedagogical practices. This highlights that AI interaction in education is rapidly reshaping the landscape of education globally, emphasizing its potential to revolutionize conventional teaching and learning methods.

Recommendations

1. The government should develop national AI pedagogy and responsible governance frameworks for education. The frameworks should address, among others, concerns related to data privacy, transparency, and fairness in AI algorithms, ensuring that the technology is used responsibly and inclusively.
2. The government should organize AI capacity-building workshops, professional training and mentoring programmes in AI technologies and pedagogical application competency for teachers.
3. The government should in collaboration with NGOs and private organizations establish sustainable funding mechanisms for the development and provision of AI-enabled tools and technical support for teachers and learners.
4. The Ministry of Education should create awareness among parents and the local communities about artificial intelligence (AI) and how AI tools are used in schools.

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