



INTEGRATING ARTIFICIAL INTELLIGENCE IN INSTRUCTIONAL DELIVERY: OPPORTUNITIES, CHALLENGES AND ETHICAL CONSIDERATIONS AS PERCEIVED BY SECONDARY SCHOOL PRINCIPALS IN PORT HARCOURT METROPOLIS



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Abstract

The study investigated the perception of secondary school principals regarding opportunities, challenges, and ethical considerations associated with integrating artificial intelligence in instructional delivery in Port-Harcourt Metropolis, Rivers State. The study was guided by three specific objectives focusing on identifying perceived opportunities, challenges, and ethical issues related to AI integration in instruction. A descriptive survey research design was adopted with a population comprising 62 principals from 31 public secondary schools in Port-Harcourt Metropolis. Census sampling was employed due to the manageable population size. Data was collected using a validated questionnaire titled "Principals Perception of AI in Instruction Questionnaire (PPAIQ)" with reliability coefficients ranging from 0.71 to 0.84 for different sections and an overall reliability of 0.85. All 62 questionnaires administered were retrieved and analyzed using frequency count and criterion mean of 2.50. Results revealed that principals perceive significant opportunities in AI integration (grand mean 2.79), particularly in providing personalized learning experiences, reducing administrative workload, offering immediate feedback, and creating engaging content. Major challenges identified (grand mean 2.83) included inadequate training, prohibitive costs, insufficient technical support, and curriculum integration difficulties. Principals expressed substantial concerns about ethical issues (grand mean 3.18), including student data privacy, algorithmic bias, critical thinking diminishment, equity concerns, reduced human interaction, and intellectual property questions. Based on these findings, the study recommends developing structured AI in mechanisms and works that prioritize high-benefit applications, establishing comprehensive professional development programs with sustainable funding mechanisms, and creating robust ethical guidelines to govern AI implementation in educational contexts. These measures would help maximize opportunities while addressing challenges and ethical considerations in AI integration for instructional delivery.

Keywords: AI in Education, AI in Instructional Delivery, Ethics in Education, Opportunit

Introduction

Secondary school education contributes immensely to human capital development because it serves as a bridge between basic education and tertiary institutions or labor market entry. In Nigeria, as in many developing nations, secondary education is recognized as a critical factor in national and economic development (Grant, 2017). The significance of secondary education extends beyond mere academic preparation, encompassing the development of essential skills that directly contribute to

economic productivity, social cohesion, and national progress. According to Okeke-James, Igbokwe, Anyanwu and Ogbo (2020), investment in quality secondary education leads to improvements in economic development as graduates of secondary schools are prepared for educational advancement as well as labour market entry. According to Irughe, Edafe and Eregha (2020), there is a strong correlation between education and economic development indices. Education globally has witnessed a paradigm shift with the integration of technology in teaching and learning processes. Digital technologies have transformed conventional classroom practices, creating more engaging, personalized, and effective learning environments (Timotheou, Miliou, Dimitriadis, Sobrino, Giannoutsou, Cachia & Ioannou, 2023). Internationally, education systems in developed countries have successfully leveraged technology to enhance educational outcomes and prepare students for the digital economy (Pu, Liang, Wang, Zhang & Zhong, 2024). In Nigeria, the National Policy on Education revised in 2013 explicitly acknowledges the necessity of technology integration in secondary education to equip students with 21st-century skills (Federal Republic of Nigeria, 2013). However, implementation has been uneven across the country, with urban centers generally demonstrating more progress than rural areas.

Within the broader context of educational technology, artificial intelligence (AI) represents perhaps the most transformative innovation of recent years. AI technologies including machine learning algorithms, natural language processing, intelligent tutoring systems, and adaptive learning platforms offer unprecedented opportunities to personalize learning, automate administrative tasks, provide real-time feedback, and enhance analytical capabilities in educational contexts (Holmes, Bialik & Fadel, 2019). Globally, AI integration in secondary education has progressed from experimental initiatives to increasingly mainstream applications. A UNESCO report by Pedro, Subosa, Rivas and Valverde (2019) on artificial intelligence in education: challenges and opportunities for sustainable development highlights how AI technologies can support efforts to achieve Sustainable Development Goal 4 when implemented thoughtfully and ethically.

Instructional delivery encompasses the methods, strategies, and approaches employed by educators to facilitate student learning. Effective instructional delivery extends beyond content transmission to include assessment, feedback, engagement, and the cultivation of critical thinking skills (Morrison, Ross, Morrison & Kalman, 2019). Traditional instructional delivery in Nigeria, particularly at the secondary level, has predominantly relied on teacher-centered approaches, with limited differentiation and personalization (Precious & Feyisetan, 2020). AI technologies offer significant potential to transform instructional delivery in several dimensions. Intelligent tutoring systems can provide personalized learning pathways based on individual student performance and learning styles. Machine learning algorithms can analyze patterns in student work to identify misconceptions and learning gaps that might otherwise go undetected. Natural language processing can enable more accessible and interactive learning materials, including automated translation for language learners (Vieriu & Petrea, 2025).

The integration of AI in instructional delivery presents numerous opportunities for secondary schools in Port Harcourt Metropolis. Perhaps most significantly, AI technologies can facilitate personalized learning experiences that accommodate diverse learning needs, preferences, and paces (Zawacki-Richter, Marín, Bond & Gouverneur, 2023). In the context of Nigerian secondary schools, where heterogeneous classrooms often include students with widely varying academic preparedness, this capability could substantially enhance learning outcomes. Administrative efficiency represents another significant opportunity. Principals in schools spend a fraction of their time on non-instructional tasks such as attendance tracking, grading, and documentation (Akporehe & Asiyai, 2021). AI automation of routine administrative tasks could reclaim this time for direct instructional activities. Additionally, AI-powered analytics can provide principals and administrators with actionable insights regarding student performance, engagement patterns, and learning trajectories that might otherwise remain invisible (Reddy, Alekhya, Sushma Manjula & Krishnappa, 2019). For students in Port Harcourt, AI integration offers enhanced access to quality educational resources regardless of school resources or principal expertise. Virtual AI teaching assistants can provide 24/7 support for homework and exam preparation, addressing the limitation of access to qualified tutors that Lin, Huang and Lu

(2023) identify as a significant barrier to academic achievement for many students in the region. Furthermore, AI technologies can support the development of advanced digital literacy and computational thinking skills increasingly demanded by employers (Pu, Liang, Wang, Zhang & Zhong, 2024).

Principal readiness constitutes another significant challenge. According to Alshorman (2024), teachers and other teaching staff in secondary schools have limited confidence in using advanced digital technologies, with even fewer (14%) expressing familiarity with AI applications. The substantial professional development investment required to prepare principals for effective AI integration must compete with numerous other priorities in constrained educational budgets. Financial sustainability poses additional challenges, particularly for public schools. The acquisition, maintenance, and regular updating of AI technologies require substantial financial commitments that many schools cannot accommodate within existing budgetary frameworks (Okunade, 2024). Furthermore, the rapid evolution of AI technologies creates risk of obsolescence without continuous investment in upgrades and professional development. Cultural resistance may also impede AI integration, with Nigerian educational traditions placing strong emphasis on principal authority and standardized instruction. Festus and Emmanuel (2025) document significant skepticism among secondary school stakeholders regarding technologies perceived as potentially displacing or diminishing principal roles. Parents, administrators, and even students may resist AI-enabled approaches that appear to conflict with traditional educational values and practices.

Questions of autonomy and human oversight also merit consideration. As AI systems increasingly inform or automate educational decisions, clear frameworks must delineate appropriate boundaries for algorithmic decision-making versus human judgment (Holmes, Bialik & Fadel, 2019). In Nigerian secondary schools, where respect for principal authority remains culturally significant, negotiating these boundaries requires particular sensitivity to stakeholder perspectives and values. Finally, equitable access to AI-enhanced education represents a critical ethical imperative. Without deliberate intervention, AI integration may exacerbate existing educational disparities between well-resourced and under-resourced schools in Port Harcourt (Tamuno & Briggs, 2023). Ethical implementation requires commitment to ensuring that AI benefits extend to all students, regardless of socioeconomic background or school resources.

Purpose of the Study

The purpose of the study was to investigate secondary school principals' perception of the opportunities, challenges and ethical issues associated with the integration of artificial intelligence in instruction in Rivers State. The specific objectives of the study are to:

1. Find out the opportunities associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis.
2. Determine the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis.
3. Ascertain the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis.

Research Questions

The study provided answers to the following questions:

1. What are the opportunities associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis?
2. What are the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis?
3. What are the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis?

Methodology

The study adopted a descriptive survey research design. The population of the study comprised 62 principals (31 for junior secondary and 31 for senior secondary) from 31 public secondary schools in Port-Harcourt (16 from Obio/Akpor and 15 from PHALGA) Metropolis (Source: Rivers State Post Primary Schools Board). The entire population of 62 principals were used because of the manageable size of the population. Consequently, census sampling was adopted. The instrument used for data collection was a questionnaire titled "Principals Perception of AI in Instruction Questionnaire (PPAIQ)". It had three sections used to collect data for each of the research questions respectively. It was structured on a four-point rating scale. The instrument was validated by three experts. One of the experts was a measurement and evaluation expert and the other two were from educational management. The internal consistency reliability for the instrument was established using Cronbach Alpha. This yielded reliability coefficients of 0.79 for section A used to elicit data on opportunities associated with integrating artificial intelligence in instructional delivery, 0.71 for section C used to elicit data on ethical issues associated with integrating artificial intelligence in instructional delivery and an overall reliability coefficient of 0.85. A total of 62 copies of the instrument were administered and a total of 62 were retrieved and used for data analysis. This constituted 100% return rate. Data gathered were analyzed using frequency count and criterion mean of 2.50.

Results

Research Question 1: What are the opportunities associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis?

Table 1: Opportunities associated with integrating AI in instructional delivery.

No.	Statement	SA	A	D	SD	Mean	S.D	Remark
1	AI tools can provide personalized learning experience for students with different abilities.	26	24	8	4	3.16	0.87	A
2	Integration of AI in teaching can reduce my administrative workload.	22	25	10	5	3.03	0.92	A
3	AI-powered assessment tools can offer immediate feedback to students.	24	23	9	6	3.05	0.96	A
4	AI technologies can help identify learning gaps in students more efficiently	8	14	27	13	2.27	0.93	D
5	Implementation of AI can make instructional content more engaging for students.	20	30	8	4	3.06	0.84	A
6	AI integration can improve access to quality educational resources in our school.	5	16	25	16	2.16	0.92	D
Grand Mean						2.79		A

The result in Table 1 shows the opportunities associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The result shows that principals from junior and senior secondary schools agreed that: AI tools can provide personalized learning experiences for students with different abilities, integration of AI in teaching can reduce administrative workload, AI-powered assessment tools can offer immediate feedback to students, and implementation of AI can make instructional content more engaging for students. This is evident by mean responses greater than 2.50 for items 1, 2, 3, and 5. In contrast, the result shows that principals from junior and senior secondary school disagreed that: AI technologies can help identify learning gaps in students more efficiently and AI integration can improve access to quality educational resources in their schools. This is evident by mean responses less than 2.50 for items 4 and 6. Generally, the result reveals that principals from junior and senior secondary schools agreed regarding the opportunities associated with integrating artificial intelligence in instructional delivery as perceived

by secondary school principals in Port-Harcourt Metropolis are agreed. This is evident by a grand mean of 2.79.

Research Question 2: What are the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis?

Table 2: Challenges associated with integrating AI in instructional delivery.

No.	Statement	SA	A	D	SD	Mean	S.D	Remark
7	Limited internet connectivity in our schools hinders AI integration.	9	15	23	15	2.29	1.00	D
8	I lack adequate training to effectively implement AI in my teaching.	25	24	8	5	3.11	0.92	A
9	Cost of AI technologies is prohibitive for widespread adoption in our school.	28	21	10	3	3.19	0.89	A
10	Technical support for AI tools is insufficient in our educational setting.	24	27	7	4	3.15	0.86	A
11	Students varying levels of technological literacy creates implementation difficulties.	6	15	26	15	2.19	0.93	D
12	Integrating AI into existing curriculum frameworks is challenging.	20	28	10	4	3.03	0.87	A
Grand Mean						2.83		A

The result in Table 2 shows the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The results show that both principals from junior and senior secondary schools agreed that: they lack adequate training to effectively implement AI in their teaching, the cost of AI technologies is prohibitive for widespread adoption in their schools, technical support for AI tools is insufficient in their educational setting, and integrating AI into existing curriculum frameworks is challenging. This is evident by mean responses greater than 2.50 for items 8, 9, 10, and 12. In contrast, the result shows that principals from junior and senior secondary school disagreed that: limited internet connectivity in their schools hinders AI integration and students have varying levels of technological literacy which creates implementation difficulties regarding the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. This is evident by mean responses less than 2.50 for items 7 and 11. Generally, the result reveals that both principals from junior and senior secondary schools agreed regarding the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. This is evident by a grand mean of 2.83.

Research Question 3: What are the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis?

Table 3: Ethical issues associated with integrating AI in instructional delivery.

No.	Statement	SA	A	D	SD	Mean	S.D	Remark
13	The use of AI in education raises concerns about student data privacy.	30	20	9	3	3.24	0.88	A
14	AI systems may perpetuate existing biases in educational assessment.	25	22	12	3	3.11	0.90	A
15	Over-reliance on AI may diminish critical thinking skills in students.	28	24	6	4	3.23	0.87	A
16	AI implementation creates equity concerns for students without home technology access.	32	18	8	4	3.26	0.91	A
17	The use of AI in teaching may reduce authentic human interaction in the classroom.	26	23	10	3	3.16	0.88	A
18	AI integration raises questions about intellectual property rights for teaching materials.	22	25	11	4	3.05	0.89	A
Grand Mean						3.18		A

The result in Table 3 shows the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The result shows that principals from junior and senior secondary schools agreed that: the use of AI in education raises concerns about student data privacy, AI systems may perpetuate existing biases in educational assessment, over-reliance on AI may diminish critical thinking skills in students, AI implementation creates equity concerns for students without home technology access, the use of AI in teaching may reduce authentic human interaction in the classroom, and AI integration raises questions about intellectual property rights for teaching materials are associated with ethical issues associated with integrating AI in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. This is evident by mean responses being greater than 2.50 for all items 13, 14, 15, 16, 17, and 18. This is evident by mean responses being less than 2.50 for items 7 and 11. Generally, the result reveals that the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. This is evident by a grand mean of 3.18.

Discussion of Findings

Research question one sought to find out the opportunities associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The result shows that principals from junior and senior secondary school agreed that: AI tools can provide personalized learning experiences for students with different abilities, Integration of AI in teaching can reduce my administrative workload, AI-powered assessment tools can offer immediate feedback to students, and Implementation of AI can make instructional content more engaging for students. In contrast, the principals disagreed that: AI technologies can help identify learning gaps in students more efficiently and AI integration can improve access to quality educational resources in our school. Generally, the result shows that the principals agreed regarding the opportunities associated with integrating artificial intelligence in instructional delivery. The result agrees with that of Cetin, Tas, Alakus and Kaplan (2024) who found that AI facilitate the teaching and learning process. The study further agrees with that of Duan and Zhao (2024) who found that AI offers new opportunities for effective instructional delivery.

Research question two sought to find out the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The result in table 2 shows that the principals agreed that: they lack adequate training to effectively implement AI in their teaching, The cost of AI technologies is prohibitive for widespread adoption in their school, technical support for AI tools is insufficient in their educational setting, and

Integrating AI into existing curriculum frameworks is challenging. In contrast, the result shows that the principals disagreed that: limited internet connectivity in their school hinders AI integration and Students' have varying levels of technological literacy which creates implementation difficulties regarding the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. Generally, the result reveals that the principals agreed regarding the challenges associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The result agrees with the observations of Pedro, Subosa, Rivas and Valverde (2019) that lack of a framework for integration of AI in education and limited teacher preparation for using AI in instructional delivery as some of the issues surrounding using AI for instructional delivery. The result also agrees with that of Ajani (2024) that digital divide, limited infrastructure, low digital literacy among educators, and ethical concerns are challenges surrounding the use of AI in education.

Research question three sought to find the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The result in table 3 shows that the principals agreed that: The use of AI in education raises concerns about student data privacy, AI systems may perpetuate existing biases in educational assessment, Over-reliance on AI may diminish critical thinking skills in students, AI implementation creates equity concerns for students without home technology access, The use of AI in teaching may reduce authentic human interaction in the classroom, and AI integration raises questions about intellectual property rights for teaching materials are associated with ethical issues associated with integrating AI in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. Generally, the result reveals that the ethical issues associated with integrating artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The finding aligns with that of Ajani (2024) who found ethical concerns as a challenge associated with AI in education.

Conclusions

Based on the findings of this study, several conclusions can be drawn regarding the integration of artificial intelligence in instructional delivery as perceived by secondary school principals in Port-Harcourt Metropolis. The study reveals that secondary school principals in Port-Harcourt Metropolis perceive significant opportunities associated with AI integration in instructional delivery. Principals strongly recognize that AI tools can provide personalized learning experiences for students with different abilities, reduce administrative workload, offer immediate feedback to students through AI-powered assessment tools, and make instructional content more engaging. The overall positive perception (grand mean of 2.79) suggests that school leaders in the region are cognizant of AI's potential to enhance teaching and learning processes, though they are less convinced about AI's capacity to identify learning gaps efficiently or improve access to quality educational resources in their specific contexts.

Regarding challenges, principals identified several significant barriers to AI integration in their schools. The most prominent challenges include inadequate training for effective AI implementation, prohibitive costs of AI technologies, insufficient technical support, and difficulties integrating AI into existing curriculum frameworks. With a grand mean of 2.83, these challenges collectively represent substantial obstacles that must be addressed for successful AI integration. Interestingly, principals did not perceive limited internet connectivity or students' varying levels of technological literacy as major barriers, suggesting that human capacity and financial constraints may be more pressing than technological infrastructure in these schools.

Concerning ethical considerations, principals demonstrated a high level of awareness (grand mean of 3.18) about various ethical issues associated with AI integration in education. They expressed significant concerns about student data privacy, potential perpetuation of existing biases in educational assessment, diminishment of critical thinking skills, equity concerns for students without home technology access, reduction in authentic human interaction, and questions about intellectual property

rights. This heightened awareness of ethical implications suggests that principals are approaching AI integration thoughtfully and with consideration for its broader societal impacts.

In summary, principals in Port-Harcourt Metropolis recognize the substantial potential of AI to transform instructional delivery, they also acknowledge significant implementation challenges and ethical considerations that require careful navigation. This balanced perspective provides a foundation for developing nuanced and context-sensitive approaches to AI integration in Nigerian secondary education.

Recommendations

Based on the findings of the study, the following recommendations were drawn

1. The Rivers State Ministry of Education, in partnership with school principals, should create a structured framework for integrating AI in schools. This framework should focus on high-impact applications like personalized learning, administrative tasks, and real-time feedback. It should also provide clear implementation guidelines, resource plans, and success metrics while addressing areas of concern such as learning gap identification.
2. Educational authorities such as Ministry of Education and Schools Board should establish comprehensive professional development programs specifically targeting AI literacy and implementation skills for principals, administrators and teachers.
3. The Rivers State Ministry of Education and Schools Board should establish a robust ethical framework for AI use in schools that includes clear data privacy protocols and fairness guidelines. This framework should be accompanied by regular ethical audits of AI implementation in schools.

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