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Artificial Intelligence Adoption in Nigerian Secondary Education: Opportunities Constraints, and Implications for Teaching and Educational Management in Ondo State

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ABSTRACT

Artificial Intelligence (AI) is increasingly transforming educational systems worldwide by enhancing instructional delivery, learning processes, and administrative efficiency. Despite its growing global relevance, the integration of AI in many developing countries, including Nigeria, remains limited due to infrastructural and institutional challenges. This study examined teachers' and school administrators' perceptions of the opportunities, challenges, readiness, and ethical concerns associated with the adoption of Artificial Intelligence in secondary school education in Ondo State, Nigeria. The study adopted a descriptive survey research design. The population consisted of teachers and school administrators in public secondary schools in the state. A sample of 360 respondents, comprising 240 teachers and 120 school administrators, was selected using a multi-stage sampling technique. Data were collected using a structured questionnaire titled Artificial Intelligence Integration in Secondary Schools Questionnaire (AIISSQ) with a Cronbach's alpha reliability coefficient of 0.82. Data were analyzed using mean and standard deviation to answer research questions, while independent samples t-test was used to test hypotheses at the 0.05 level of significance. The findings revealed that respondents generally perceived AI as having strong potential to enhance teaching effectiveness, personalized learning, assessment practices, and school management. However, major challenges identified included inadequate ICT infrastructure, unreliable electricity supply, limited technical expertise among teachers, poor internet connectivity, and insufficient funding. The results further indicated a moderate level of institutional readiness for AI integration in secondary schools. Hypothesis testing showed no significant difference between teachers' and administrators' perceptions of ethical and policy concerns regarding AI integration ($t = 0.962$, $p = 0.337 > 0.05$). The study concludes that although AI offers significant opportunities for improving educational quality, its successful implementation in Nigerian secondary schools requires strengthened ICT infrastructure, targeted teacher training, and clear policy frameworks to ensure responsible and sustainable adoption.

INTRODUCTION

Artificial Intelligence (AI) refers to the capability of computer systems to perform tasks that typically require human intelligence, including learning, reasoning, and decision-making. such as learning, reasoning, problem-solving, and decision-making. Within educational environments, AI-driven technologies encompass intelligent tutoring systems, adaptive learning platforms, automated assessment tools, learning analytics, and administrative support systems, all of which offer significant potential to enhance instructional quality and institutional effectiveness (Holmes, Bialik, & Fadel, 2021; UNESCO, 2021). Globally, the integration of AI into education has become a defining characteristic of the Fourth Industrial Revolution, reshaping pedagogical approaches, assessment practices, and educational management across both developed and developing contexts (Zawacki-Richter *et al.*, 2019; OECD, 2023).

In Nigeria, the growing interest in AI adoption within the education sector is closely linked to broader national digital transformation and education reform agendas. The Federal Ministry of Education has increasingly emphasized the strategic deployment of digital technologies to improve access, equity, and quality across basic and secondary education (Federal Ministry of Education [FME], 2023). Complementing this effort, the National Artificial Intelligence Strategy developed by the National Information Technology Development Agency underscores AI capacity development, ethical governance, and sector-specific implementation—particularly in education—as central to national socio-economic development (NITDA, 2023). These policy initiatives reflect Nigeria's commitment to leveraging AI-enabled solutions to address persistent systemic challenges, including teacher shortages, inefficient school administration, weak assessment mechanisms, and limited data-driven decision-making within schools (UNESCO, 2021; OECD, 2023).

At the sub-national level, several Nigerian states, including Ondo State, have initiated technology-oriented educational interventions such as teacher ICT training programmes, digital literacy initiatives, and pilot technology-supported school projects aimed at improving instructional delivery and school management. Despite these efforts, the actual integration of advanced AI-based tools into classroom instruction and administrative operations in public

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secondary schools remains relatively limited. Empirical evidence from African and other developing-country contexts consistently points to structural and capacity-related constraints—such as inadequate ICT infrastructure, unreliable electricity supply, restricted access to digital resources, and insufficient teacher preparedness—as major impediments to effective AI adoption in education (Msafiri *et al.*, 2023; UNESCO, 2021).

Beyond infrastructural and capacity challenges, the introduction of AI into secondary education raises critical ethical and professional concerns. Issues related to data privacy, algorithmic bias, unequal access, regulatory gaps, and the potential reconfiguration of teachers' professional roles continue to generate debate among educators, school leaders, and policymakers (UNESCO, 2021; Igbokwe, 2024; OECD, 2023). Consequently, examining how teachers and school administrators perceive both the opportunities and challenges of AI within the specific socio-educational context of Ondo State is essential for informing realistic policy formulation, effective capacity development, and the sustainable integration of AI in Nigerian secondary education.

Statement of the Problem

Despite increasing national policy support for digital transformation and artificial intelligence adoption in education, the practical implementation of AI in Nigerian secondary schools remains limited, uneven, and largely exploratory. There is a growing disconnect between national policy aspirations on AI-driven education and the operational realities of schools, particularly with regard to infrastructure availability, teacher competence, institutional readiness, and administrative capacity (Federal Ministry of Education [FME], 2023; UNESCO, 2021). Consequently, many public secondary schools are unable to translate policy intentions into meaningful classroom practices and effective school management processes.

Furthermore, empirical evidence on the actual level of awareness, readiness, acceptance, and utilization of AI among secondary school teachers and administrators at the state level remains scarce. Studies conducted in broader Nigerian and African contexts indicate concerns such as fear of job displacement, inadequate professional training, limited digital skills, and resistance to technological change among educators (Igbokwe, 2024; OECD, 2023). However, there is limited context-specific data focusing on Ondo State. This lack of localized empirical evidence constrains the ability of policymakers, school administrators, and education stakeholders to design targeted, context-appropriate interventions that address the real opportunities and challenges associated with AI integration in secondary school teaching and management.

Purpose of the Study

The main purpose of this study is to assess the opportunities and challenges associated with the integration of Artificial Intelligence (AI) into secondary school management and teaching in Ondo State, Nigeria. Specifically, the study seeks to:

1. Assess teachers' and administrators' levels of awareness and understanding of AI concepts and applications in education.
2. Determine the readiness of teachers and school administrators to adopt AI-based tools in instructional and administrative practices.
3. Identify perceived opportunities of AI for enhancing teaching and learning processes.
4. Examine perceived benefits of AI for school management and administrative efficiency.
5. Investigate infrastructural, technical, and professional training challenges affecting AI adoption in secondary schools.
6. Explore ethical, privacy, and policy concerns associated with AI integration in school management and teaching.
7. Recommend strategies for effective and sustainable implementation of AI in secondary schools in Ondo State.

Research Questions

1. What opportunities does Artificial Intelligence (AI) provide for school management and teaching in secondary schools in Ondo State?
2. What challenges are associated with the implementation of Artificial Intelligence (AI) in school management and teaching in secondary schools in Ondo State?
3. How prepared are school administrators and teachers for the integration of Artificial Intelligence (AI) into educational administration and classroom instruction in Ondo State?
4. What is the perceived impact of Artificial Intelligence (AI) on teaching and learning outcomes in secondary schools in Ondo State?
5. What ethical and policy concerns do teachers and school administrators associate with the integration of Artificial Intelligence (AI) in secondary schools in Ondo State?

Research Hypotheses

H_{01a}: There is no significant difference between teachers' and administrators' perceptions of AI opportunities in school management.

H_{01b}: There is no significant difference between teachers' and administrators' perceptions of AI opportunities in teaching.

H_{02}: There is no significant difference between teachers' and school administrators' perceptions of the challenges of Artificial Intelligence (AI) implementation in education.

H_{03}: There is no significant difference in the level of readiness for Artificial Intelligence (AI) integration between school administrators and teachers.

H_{04}: There is no significant difference between teachers'

and school administrators' perceptions of the impact of Artificial Intelligence (AI) on educational outcomes.

H_{05}: There is no significant difference between teachers' and school administrators' perceptions of ethical and policy concerns regarding AI integration

Significance of the Study

This study is significant because it provides empirical evidence that can guide policymakers, education administrators, and teacher-training institutions in Nigeria on effective strategies for integrating Artificial Intelligence (AI) into secondary education. The findings will assist the Ondo State Ministry of Education in aligning AI-related initiatives with school-level realities, thereby promoting capacity building, effective implementation, and ethical use of AI technologies

The study also contributes to the global literature on AI in education by providing contextual evidence from a developing country perspective, which is often under-represented in international research (Holmes *et al.*, 2021; Luckin, 2023). Furthermore, the findings align with Nigeria's national digital transformation agenda (FME, 2023; NITDA, 2023) and contribute to the achievement of Sustainable Development Goal 4 (Quality Education) through technology-driven innovation and inclusive educational practices (UNESCO, 2021).

Delimitation of the Study

This study is delimited to public secondary schools in Ondo State and focuses on teachers and school administrators. It examines awareness, perceived opportunities, readiness, challenges, and ethical concerns related to Artificial Intelligence (AI) integration, but does not involve the experimental implementation or evaluation of specific AI software or platforms. Geographically, the study covers both urban and rural schools to ensure adequate representation. Conceptually, the study emphasizes perceptions and readiness rather than objectively measured academic performance or policy impact outcomes.

LITERATURE REVIEW

This literature review synthesizes theoretical foundations, conceptual clarifications, and empirical evidence on the integration of Artificial Intelligence (AI) in education, focusing on technology adoption theories, AI applications in teaching and management, readiness factors, and ethical issues, with attention to the Nigerian context.

Theoretical Frameworks

A robust theoretical grounding is essential for understanding how AI technologies are perceived and adopted in educational settings. The Technology Acceptance Model (TAM) remains the most widely applied framework in technology adoption research. It posits that individuals' perceived usefulness and perceived ease of use significantly influence their intention to adopt new technologies (Davis, 1989). Recent systematic reviews confirm the dominance of TAM in AI adoption studies among educators, highlighting performance expectancy and effort expectancy as key determinants of acceptance (Xue, Ghazali, & Mahat, 2025). This suggests that teachers are more likely to adopt AI tools when they recognize clear instructional benefits and perceive them as user-friendly. Extensions of TAM, including TAM2 and unified models, incorporate additional variables such as social influence and facilitating conditions, which further explain variations in technology acceptance across contexts (Nasni Naseri & Abdullah, 2024; Ching & Jamaludin, 2025).

Theoretical Frameworks Supporting AI Adoption

The Diffusion of Innovations (DOI) theory explains how innovations spread through social systems based on characteristics like relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). Complementing DOI, the Technology–Organization–Environment (TOE) framework highlights how technological capabilities, organizational readiness, and environmental factors such as policy and infrastructure influence adoption (Naseri & Abdullah, 2024). These frameworks collectively provide a foundation for investigating teachers' and administrators' readiness, perceived opportunities, and challenges in integrating AI into secondary education.

Ethical and Governance Considerations

AI integration raises significant ethical concerns, including privacy, transparency, fairness, and accountability. Effective governance frameworks are necessary to mitigate risks associated with biased algorithms, inequitable access, and misuse of data (UNESCO, 2021; Nguyen, Ho, & Lee, 2023). Evidence from AI ethics education suggests that pedagogy and assessment practices must address both technical competence and ethical reasoning to prevent the reinforcement of existing inequities within educational systems

Conceptual Review

Artificial Intelligence in Education

Artificial Intelligence (AI) refers broadly to computational systems that perform tasks normally requiring human intelligence, such as reasoning, pattern recognition, and decision-making (Luckin, Holmes, Griffiths, & Forcier, 2016). In education, AI encompasses intelligent tutoring systems, adaptive content delivery, automated feedback and assessment, and data analytics designed to enhance personalized learning and operational efficiency (Holmes, Bialik, & Fadel, 2019; UNESCO, 2021). AI tools, such as intelligent analytics, enable tailored student support, diagnostic assessment, and real-time instructional feedback, potentially transforming traditional pedagogies and administrative processes.

Globally, AI has emerged as a defining feature of the Fourth Industrial Revolution, reshaping educational practices and management systems (Zawacki-Richter,

Marín, Bond, & Gouverneur, 2019; OECD, 2023). In Nigeria, interest in integrating AI and digital technologies into education has grown in recent years, driven by national digital transformation initiatives and policy frameworks, such as the National Digital Learning Policy (FME, 2023) and the National AI Strategy (NITDA, 2024).

AI for Teaching and Learning

AI's role in teaching and learning includes facilitating personalized learning experiences based on learners' performance data, reducing teacher workload through automated assessment, and supporting differentiated instruction (Naseri & Abdullah, 2024). Studies show that AI-driven tutoring systems and adaptive learning environments can improve motivation and learning outcomes when integrated with sound pedagogical strategies. However, the effectiveness of these tools is strongly influenced by teachers' digital literacy, pedagogical competence, and institutional support structures (Olaiya, Ajala, Azeez, & Taiwo, 2025). Inadequate preparation among educators and limited access to digital resources can hinder successful implementation.

AI for School Management

AI also offers administrative advantages, automating tasks such as attendance tracking, scheduling, and predictive analytics for resource allocation. These tools can improve the quality of decision-making and operational efficiency within schools. However, in Nigerian secondary school contexts, adoption of AI in management remains emergent, constrained by infrastructure limitations, insufficient technical training, and weak digital policy implementation (Bali, Garba, Ahmadu, Takwate, & Malgwi, 2024). Targeted investment in infrastructure and professional development is therefore essential to realize the full benefits of AI-based school management systems.

Readiness for AI Integration

Readiness for AI integration involves technical, pedagogical, and policy preparedness. Teachers' awareness, confidence, and willingness to adopt AI are critical, yet often insufficient in Nigerian secondary schools (Olaiya *et al.*, 2025). Institutional factors, including leadership support, peer influence, and access to functional ICT resources, also shape the adoption of AI technologies (Ghimire & Edwards, 2024). Readiness is not merely a function of access to technology but is mediated by socio-cultural and organizational factors affecting educators' adoption behaviors.

Empirical Review

Holmes and Tuomi (2022) provided a comprehensive review of the state of the art and practice of artificial intelligence in education, examining how AI-supported systems such as intelligent tutoring systems, adaptive learning platforms, and learning analytics are being applied across educational contexts. Their review emphasized that while AI technologies hold substantial potential to support personalized learning and instructional efficiency, their effectiveness is highly dependent on teachers' pedagogical competence, professional judgment, and the presence of supportive institutional structures. The authors further cautioned that AI should be viewed as a complement to, rather than a replacement for, teacher-guided instruction.

Similarly, a systematic review by Zawacki-Richter *et al.* (2019), which analyzed 146 empirical studies on artificial intelligence applications in education, revealed that the majority of AI research focuses on profiling and prediction, intelligent tutoring systems, assessment, and adaptive learning environments. The review also highlighted a notable gap in the application of AI for educational administration and strategic decision-making, indicating that management-oriented uses of AI remain under-explored in the literature. This imbalance suggests the need for further empirical research on AI-supported school management and leadership practices.

Empirical evidence from African contexts indicates growing awareness of artificial intelligence and digital technologies in education, but limited practical adoption due to systemic constraints. Studies on digital education in Sub-Saharan Africa show that while teachers and school leaders increasingly recognize the potential of advanced technologies for improving teaching, learning, and data management, adoption is hindered by inadequate infrastructure, limited professional training, and unreliable internet connectivity (Unwin *et al.*, 2020; UNESCO, 2021).

A large body of African-focused digital education research further indicates that emerging technologies are often concentrated in pilot projects and urban schools, leaving rural institutions at a disadvantage due to persistent electricity and connectivity challenges (World Bank, 2022). These structural barriers limit the scalability of AI-driven instructional and administrative innovations across the continent.

In Nigeria, empirical studies consistently report that while secondary school teachers and administrators demonstrate moderate digital literacy, awareness and use of artificial intelligence tools for teaching and school management remain low. Research on ICT readiness in Nigerian secondary schools highlights infrastructural deficiencies, inadequate internet access, and limited exposure to advanced digital tools as major barriers to technology integration (Ogunode *et al.*, 2023).

Recent empirical evidence also suggests that Nigerian teachers generally hold positive attitudes toward the potential use of AI in education, particularly for instructional support and assessment, but lack the technical skills and professional training required for effective adoption (David *et al.*, 2025; Igbokwe, 2024). Policy-oriented studies further indicate that although national digital education strategies emphasize innovation and data-driven decision-making, implementation at the school level remains constrained by funding limitations and institutional capacity gaps (Federal Ministry of Education [FME], 2023).

Collectively, these studies reveal that most existing Nigerian research focuses either on teaching or on general ICT adoption, with limited attention to the combined instructional and management dimensions of AI integration within the same empirical framework. Moreover, ethical, governance, and data-privacy concerns related to AI use in secondary schools remain under-explored. The present study therefore addresses these gaps by examining both teachers' and administrators' perceptions of opportunities, readiness, challenges, and ethical concerns associated with AI adoption in public secondary schools in Ondo State.

Gaps in the Literature

Despite growing scholarly attention to AI in education, several gaps remain:

- Limited state-specific evidence on teachers' and administrators' perceptions and readiness for AI integration in Nigerian secondary schools.
- Insufficient research on how leadership practices and professional development affect AI adoption.
- Under-researched ethical and governance practices of AI in real school contexts.
- Inadequate understanding of administrators' capacity to utilize AI-driven analytics for decision-making.

This study addresses these gaps by investigating these dimensions within the context of secondary schools in Ondo State, Nigeria, thereby offering empirical evidence to inform policy and practice.

MATERIALS AND METHODS

Research Design

This study adopted a descriptive survey research design. The design was considered appropriate because it enables the researcher to systematically collect data from a large group of respondents in order to describe their perceptions, attitudes, and experiences regarding a particular phenomenon. The descriptive survey approach was suitable for this study as it allowed the researcher to obtain information from teachers and school administrators on issues relating to the opportunities, challenges, readiness, and ethical concerns associated with the integration of Artificial Intelligence in secondary school education, without manipulation of variables (Creswell & Creswell, 2023). The design also permits the collection of quantitative data through structured questionnaires and facilitates the use of statistical techniques such as mean, standard deviation, and t-test to analyze respondents' perceptions. Furthermore, the descriptive survey design enables the researcher to generalize findings from the sample to the broader population of secondary school educators in Ondo State.

Population of the Study

The target population comprised teachers and school administrators (principals, vice-principals, and heads of departments) in public secondary schools in Ondo State, Nigeria. According to data obtained from the Ondo State Ministry of Education, there are approximately 8,600 teachers and 630 administrators in public secondary schools in the state (Ondo State Ministry of Education, 2024).

Sample and Sampling Technique

A total of 360 respondents were selected from the three senatorial districts of Ondo State using a multi-stage sampling technique.

First, two Local Government Areas (LGAs) were randomly selected from each senatorial district. Second, five public secondary schools were randomly selected from each selected LGA. Finally, within each school, eight teachers were selected using simple random sampling, while four school administrators were selected purposively due to their limited numbers and key administrative roles.

Thus:

3 districts × 2 LGAs × 5 schools × 12 respondents = 360 participants

The sample size is considered adequate for descriptive survey studies involving large populations, as recommended by Krejcie and Morgan (1970).

Research Instrument

The instrument for data collection was a structured questionnaire titled:

Artificial Intelligence in Secondary School Education in Nigeria: Opportunities and Challenges Questionnaire (AISSENOCQ).

The questionnaire consisted of Six sections (A–F):

- Section A: Demographic information
- Section B: Opportunities of Artificial Intelligence in teaching and learning
- Section C: Challenges of Artificial Intelligence in teaching and school management
- Section D: Teachers' and administrators' readiness and perceptions toward AI integration
- Section E: Perceived impact of Artificial Intelligence on teaching and learning outcomes
- Section F: Ethical, Privacy, and Policy Concerns of AI Integration

Items in Sections B, C, D, E and F were structured on a 4-point Likert scale as follows:

Response Option-Rating
Strongly Agree (SA)-4
Agree (A)-3
Disagree (D)-2
Strongly Disagree (SD)-1

Validity of the Instrument

The instrument was subjected to face and content validation by three experts—two in Educational Technology and one in Measurement and Evaluation—from Adekunle Ajasin University, Akungba-Akoko. Their comments were used to revise ambiguous items, improve clarity, and ensure alignment with the study objectives. Establishing content validity helps ensure that the instrument adequately represents the constructs being measured (Fraenkel, Wallen, & Hyun, 2022).

Although construct validity through factor analysis was not conducted, this is acknowledged as a limitation of the study and is recommended for future research.

Reliability of the Instrument

To establish reliability, the questionnaire was pilot-tested among 30 teachers and 10 administrators in secondary schools outside the study area. The data obtained were analyzed. The internal consistency of each section of the questionnaire was assessed using Cronbach's alpha. Results showed high reliability for Opportunities (α = 0.85), Challenges (α = 0.83), Readiness (α = 0.81), Perceived Impact (α = 0.86), and Ethical/Policy Concerns (α = 0.84), indicating that each subscale consistently measured its respective construct, which indicates good internal consistency for survey instruments (Taber, 2018).

Method of Data Collection

The researcher, with the assistance of trained research assistants, personally administered the questionnaires to the respondents. Participants were informed about the purpose of the study, assured of confidentiality, and informed that participation was voluntary. This procedure enhanced response accuracy and ensured a high rate of questionnaire retrieval (Bryman, 2023).

Method of Data Analysis

Data were analyzed using both descriptive and inferential statistics.

Descriptive statistics, including mean, standard deviations, frequency, and percentage, were used to answer the research questions and to rank perceived opportunities and challenges.

Inferential analysis was conducted using the independent samples t-test to determine whether significant differences existed between teachers' and school administrators' perceptions at the 0.05 level of significance. The t-test was considered appropriate because the hypotheses focused on comparing the mean responses of two independent groups. These analytical procedures are consistent with recommendations for survey-based educational research (Field, 2022).

RESULTS AND DISCUSSIONS

Artificial Intelligence in Secondary School Education in Nigeria: Opportunities and Challenges Questionnaire (AISSENOCQ)

Responses were rated on a 4-point Likert scale: Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1).

Section A: Demographic Information

Gender: ☐ Male ☐ Female

Age: ☐ Below 30 ☐ 30–39 ☐ 40–49 ☐ 50 and above

Academic Qualification: ☐ NCE ☐ B.Ed/B.Sc(Ed) ☐ M.Ed/M.Sc(Ed) ☐ PhD

Teaching Experience: ☐ Below 5 years ☐ 6–10 years ☐ 11–15 years ☐ Above 15 years

Current School Type: ☐ Urban ☐ Rural

A mean score of 3.00 and above indicates agreement, while a mean score below 3.00 indicates disagreement.

Table 1: Showing the survey of Opportunities of AI in Education in Ondo state

s/n	Items	SA	A	D	SD	Mean	SD
1	AI enhances efficient record keeping and data management in schools	190 (52.8%)	130 (36.1%)	30 (8.3%)	10 (2.8%)	3.39	0.69
2	AI tools support teachers in lesson planning and content delivery	170 (47.2%)	145 (40.3%)	35 (9.7%)	10 (2.8%)	3.32	0.71
3	AI improves student engagement and personalized learning.	155 (43.1%)	150 (41.7%)	40 (11.1%)	15 (4.2%)	3.23	0.75
4	. AI reduces teachers' workload and administrative stress	180 (50.0%)	120 (33.3%)	45 (12.5%)	15 (4.2%)	3.29	0.78
5	The use of AI improves decision-making in school management.	165 (45.8%)	140 (38.9%)	40 (11.1%)	15 (4.2%)	3.26	0.74
6	AI provides real-time student performance tracking	175 (48.6%)	135 (37.5%)	35 (9.7%)	15 (4.2%)	3.30	0.73
7	AI promotes innovation and creativity in classroom teaching.	160 (44.4%)	150 (41.7%)	35 (9.7%)	15 (4.2%)	3.26	0.76
8	. AI helps identify students' learning difficulties early	155 (43.1%)	145 (40.3%)	45 (12.5%)	15 (4.2%)	3.22	0.78
9	AI enhances communication between teachers, students, and parents	170 (47.2%)	130 (36.1%)	40 (11.1%)	20 (5.6%)	3.25	0.79
10	AI supports continuous professional development for teachers.	160 (44.4%)	145 (40.3%)	40 (11.1%)	15 (4.2%)	3.25	0.75

Grand Mean = 3.28, SD = 0.75

Step 1: Section B, Opportunities of AI in Education
Research Question 1: What are the opportunities provided by AI for school management and teaching in Ondo State?
In answering the research question 1, table 1 is used

Table 1 shows that respondents generally agree that artificial intelligence offers substantial opportunities for improving instructional delivery and administrative efficiency in secondary schools in Ondo State (Grand Mean = 3.28, SD = 0.75).

Table 2: Showing survey of challenges associated with the implementation of Artificial Intelligence (AI) in school management and teaching in Ondo State

s/n	Items	SA	A	D	SD	Mean	SD
1	Lack of adequate ICT infrastructure limits AI implementation	200 (55.6%)	120 (33.3%)	25 (6.9%)	15 (4.2%)	3.40	0.74
2	Insufficient technical skills among teachers hinder AI usage	185 (51.4%)	130 (36.1%)	30 (8.3%)	15 (4.2%)	3.35	0.75
3	. High cost of AI technologies discourages school adoption.	190 (52.8%)	125 (34.7%)	30 (8.3%)	15 (4.2%)	3.36	0.74
4	. . Poor internet connectivity affects AI integration in schools.	175 (48.6%)	135 (37.5%)	35 (9.7%)	15 (4.2%)	3.30	0.75
5	Fear of job loss due to automation discourages teachers from using AI..	145 (40.3%)	135 (37.5%)	55 (15.3%)	25 (6.9%)	3.11	0.86
6	. Limited government support affects AI development in education.	185 (51.4%)	130 (36.1%)	30 (8.3%)	15 (4.2%)	3.35	0.75
7	. Lack of regular training prevents teachers from effectively using AI.	180 (50.0%)	130 (36.1%)	35 (9.7%)	15 (4.2%)	3.32	0.76
8	. Resistance to change among staff slows down AI adoption.	155 (43.1%)	140 (38.9%)	45 (12.5%)	20 (5.6%)	3.19	0.80
9	Ethical and data privacy issues discourage AI use in schools	160 (44.4%)	130 (36.1%)	45 (12.5%)	25 (6.9%)	3.18	0.82
10	Inconsistent power supply affects the effectiveness of AI tools.	195 (54.2%)	115 (31.9%)	30 (8.3%)	20 (5.6%)	3.34	0.80

Grand Mean = 3.29, SD = 0.78

Section C: Challenges of Implementing AI in Education.
This section addresses Research Question 2.
Research Question 2: What are the challenges associated with the implementation of Artificial Intelligence (AI) in school management and teaching in Ondo State?

Interpretation
In table 2, respondents generally agreed that significant challenges impede AI integration in schools. The results suggest that the most prominent perceived barriers include poor infrastructure, high costs, limited technical capacity, and inconsistent power supply. The perception shows that the readiness of educational institutions for AI adoption remains limited, particularly in rural and semi-urban schools.
Section D: Management Preparedness and Readiness for AI Integration
This section focusses on the institutional and Leadership readiness for integrating Artificial Intelligence (AI) in

Table 3: showing survey of preparedness of school management and teachers for the integration of Artificial Intelligence (AI) in educational administration and teaching in Ondo State

s/n	Items	SA	A	D	SD	Mean	SD
1	My school has a clear policy framework for AI integration.	135 (37.5%)	145 (40.3%)	55 (15.3%)	25 (6.9%)	3.08	0.84
2	School leaders provide encouragement for AI adoption.	150 (41.7%)	140 (38.9%)	45 (12.5%)	25 (6.9%)	3.15	0.82
3	Adequate funding is provided to support AI-driven initiatives.	120 (33.3%)	135 (37.5%)	70 (19.4%)	35 (9.7%)	2.94	0.90
4	Teachers are regularly trained on the use of AI in teaching.	130 (36.1%)	140 (38.9%)	60 (16.7%)	30 (8.3%)	3.03	0.86
5	My school has access to digital learning platforms powered by AI.	145 (40.3%)	135 (37.5%)	55 (15.3%)	25 (6.9%)	3.09	0.84

6	School administrators have a good understanding of AI applications.	140 (38.9%)	130 (36.1%)	60 (16.7%)	30 (8.3%)	2.99	0.87
7	Teachers are motivated to explore AI tools in instruction.	150 (41.7%)	130 (36.1%)	55 (15.3%)	25 (6.9%)	3.04	0.85
8	AI integration aligns with the school's educational goals.	155 (43.1%)	130 (36.1%)	50 (13.9%)	25 (6.9%)	3.15	0.83
9	Collaboration between teachers and ICT coordinators supports AI use.	160 (44.4%)	125 (34.7%)	55 (15.3%)	20 (5.6%)	3.18	0.81
10	The school management is ready to implement AI-based teaching innovations.	145 (40.3%)	135 (37.5%)	55 (15.3%)	25 (6.9%)	3.10	0.84

Grand Mean = 3.08, SD = 0.84

school administration and classroom instruction.

Research Question 3: How prepared are school management and teachers for the integration of Artificial Intelligence (AI) in educational administration and teaching in Ondo State?

Interpretation

Table 3 findings indicate a moderate level of preparedness among school management and teachers toward AI integration. While most respondents agree that leadership and teachers are open to AI adoption, areas such as funding, training, and policy direction remain relatively weak. This suggests that although the grand mean of 3.08 suggests a generally positive disposition toward AI integration, the relatively lower mean scores for funding, training, and policy availability indicate that institutional preparedness remains moderate rather than robust.

Section E: Perceived Impact of Artificial Intelligence (AI) on Teaching and Learning Outcomes

This section evaluates how AI integration influences students' academic engagement, learning outcomes, and teachers' instructional efficiency.

Table 4: Showing survey of perceived impact of AI on teaching and learning outcomes in secondary schools in Ondo State

s/n	Items	SA	A	D	SD	Mean	SD	Decision
1	AI enhances students' critical thinking and problem-solving skills.	175 (48.6%)	135 (37.5%)	35 (9.7%)	15 (4.2%)	3.31	0.74	
2	AI tools make teaching more interactive and engaging.	185 (51.4%)	130 (36.1%)	30 (8.3%)	15 (4.2%)	3.35	0.73	
3	Students perform better when AI-assisted instructional tools are used.	170 (47.2%)	140 (38.9%)	35 (9.7%)	15 (4.2%)	3.29	0.75	
4	AI promotes individualized learning and assessment.	160 (44.4%)	145 (40.3%)	40 (11.1%)	15 (4.2%)	3.26	0.76	
5	AI encourages collaboration among teachers and students.	150 (41.7%)	145 (40.3%)	45 (12.5%)	20 (5.6%)	3.18	0.80	
6								
	AI contributes to effective classroom management.	165 (45.8%)	140 (38.9%)	40 (11.1%)	15 (4.2%)	3.26	0.76	
7	AI-based learning improves students' retention of complex concepts.	160 (44.4%)	135 (37.5%)	45 (12.5%)	20 (5.6%)	3.21	0.79	
8	Teachers' productivity increases through AI-assisted tasks.	175 (48.6%)	130 (36.1%)	35 (9.7%)	20 (5.6%)	3.32	0.77	
9	AI supports inclusive learning for students with special needs.	155 (43.1%)	135 (37.5%)	45 (12.5%)	25 (6.9%)	3.17	0.82	
10	Overall, AI enhances the quality of education delivery in schools.	180 (50.0%)	130 (36.1%)	35 (9.7%)	15 (4.2%)	3.36	0.74	

Grand Mean = 3.27, SD = 0.77

Research Question 4: What is the perceived impact of AI on teaching and learning outcomes in secondary schools in Ondo State?

Interpretation

Findings from Table 4 indicate that both teachers and administrators hold positive perceptions of AI's potential impact on teaching and learning. Respondents agree that AI enhances interactivity, student engagement, individualized learning, and instructional productivity. However, implementation is still dependent on institutional readiness and access to supportive technology.

Table 5: Ethical, Privacy, and Policy Concerns of AI Integration (RQ5)

s/n	Items	SA	A	D	SD	Mean	SD	Decision
1	1. Teachers are aware of importance of protecting student data privacy.	160 (44.4%)	140 (38.9%)	40 (11.1%)	20 (5.6%)	3.31	0.74	
2	2. School ensures ethical use of AI in teaching and management.	150 (41.7%)	145 (40.3%)	45 (12.5%)	20 (5.6%)	3.25	0.76	
3	3. School has clear policies guiding AI use in education.	140 (38.9%)	150 (41.7%)	50 (13.9%)	20 (5.6%)	3.21	0.77	
4	4. AI is applied fairly in assessing student performance.	145 (40.3%)	140 (38.9%)	50 (13.9%)	25 (6.9%)	3.22	0.78	
5	5. Government policies support adoption and use of AI.	130 (36.1%)	145 (40.3%)	55 (15.3%)	30 (8.3%)	3.14	0.81	
6	6. Teachers are guided on responsible AI use in classrooms.	150 (41.7%)	135 (37.5%)	50 (13.9%)	25 (6.9%)	3.20	0.78	
7	7. Students' personal info is adequately protected.	155 (43.1%)	135 (37.5%)	50 (13.9%)	20 (5.6%)	3.25	0.75	
8	8. Measures prevent bias in AI algorithms affecting learning.	140 (38.9%)	140 (38.9%)	55 (15.3%)	25 (6.9%)	3.17	0.79	
9	9. School has monitoring systems for ethical AI use.	145 (40.3%)	135 (37.5%)	55 (15.3%)	25 (6.9%)	3.21	0.78	
10	10. Staff receive training on ethical and policy aspects of AI.	150 (41.7%)	140 (38.9%)	45 (12.5%)	25 (6.9%)	3.25	0.77	

Grand Mean = 3.22, SD = 0.78

Section F

Research question 5: What ethical and policy concerns do teachers and school administrators associate with the integration of Artificial Intelligence (AI) in secondary schools in Ondo State?

Ethical, Privacy, and Policy Concerns of AI Integration

The findings from table 5, on ethical, privacy, and policy concerns of AI integration in schools revealed that respondents generally agree that these issues are being addressed. The ten items had mean scores ranging from 3.14 to 3.31, with a grand mean of 3.22 and a standard deviation of 0.78, indicating moderate consensus. Items related to teachers' awareness of student data privacy, protection of students' personal information, ethical AI use, and staff training recorded the highest agreement, suggesting that schools are making significant efforts in these areas. Conversely, items on government policy support for AI adoption and measures to prevent bias in AI algorithms received slightly lower mean scores, highlighting areas that require further attention. Overall, the results suggest that while schools are proactively managing ethical and privacy aspects of AI, there is a need for stronger policy frameworks and government support to ensure responsible and fair AI implementation.

Table 6a: Showing t-test analysis of difference between teachers' and administrators' perceptions of AI opportunities in school management.

Group	N	Mean	SD	df	t	p-value
Teachers	240	3.28	0.70	358	1.214	0.225
Administrators	120	3.23	0.66			

P > 0.05

Hypotheses Testing

Hypothesis 1a

There is no significant difference between teachers' and administrators' perceptions of AI opportunities in school management.

Table 6a Reveal the independent samples t-test revealed that there was no significant difference between teachers' (M = 3.28, SD = 0.70) and administrators' (M = 3.22, SD = 0.66) perceptions of AI opportunities in school management, t(358) = 1.214, p = .225.

Table 6b: Showing t-test analysis of difference between teachers' and administrators' perceptions of AI opportunities in teaching.

Group	N	Mean	SD	df	t	p-value
Teachers	240	3.32	0.73	358	1.356	0.176
Administrators	120	3.25	0.69			

P > 0.05

Hypothesis 1b

There is no significant difference between teachers' and administrators' perceptions of AI opportunities in teaching.

From table 6b, the independent samples t-test showed that there was no significant difference between teachers' (M = 3.32, SD = 0.73) and administrators' (M = 3.25, SD = 0.69) perceptions of AI opportunities in teaching, t(358) = 1.356, p = .176, hence the hypothesis was not rejectedt(358) = 1.214, p = .225.

Table 7: Showing t-test analysis of difference between teachers' and administrators' perceptions of the challenges of AI implementation in education

Group	N	Mean	SD	df	t	p-value
Teachers	240	3.32	0.78	358	1.096	0.274
Administrators	120	3.25	0.76			

Decision: $p = 0.274 > 0.05 \rightarrow$ Fail to reject H_0

Hypothesis 2

H_{02}: There is no significant difference between teachers' and administrators' perceptions of the challenges of AI implementation in education.

Interpretation

In table 7, Indicate that the mean and S D for teachers and administrators were 3.32; 0.78 and 3.25; 0.76 respectively. The t-cal indicated 1.096. @ df=358. The P-val was 0.294 which greater than 0.05. Hence hypothesis was not rejected.

Table 8: Showing t-test analysis of difference in AI readiness between school management and teachers

Group	N	Mean	SD	df	t	p-value
Teachers	240	3.06	0.84	358	0.884	0.377
Administrators	120	3.12	0.83			

Decision: $p = 0.377 > 0.05 \rightarrow$ Fail to reject H_0.

Hypothesis 3

H_{03}: There is no significant difference in AI readiness between school management and teachers.

Interpretation

In table 8, Indicate that the mean and S D for teachers and administrators were 3.06; 0.84 and 3.12; 0.83 respectively. The t-cal indicated 0.884. @ df=358. The P-val was 0.377 which greater than 0.05. Hence hypothesis was not rejected.

Table 9: Showing the t-test analysis of difference between teachers' and administrators' perceptions of AI's impact on educational outcomes

Group	N	Mean	SD	df	t	p-value
Teachers	240	3.25	0.77	358	0.994	0.321
Administrators	120	3.30	0.79			

Decision: $p = 0.321 > 0.05 \rightarrow$ Fail to reject H_0

Hypothesis 4

H_{04}: There is no significant difference between teachers' and administrators' perceptions of AI's impact on educational outcomes.

Interpretation

In table 9, Shows that the mean and S D for teachers and administrators were 3.25; 0.77 and 3.30; 0.79 respectively. The t-cal indicated 0.994. @ df=358. The P-val was 0.321 which greater than 0.05. Hence hypothesis was not rejected.

Hypothesis 5

H_{05}: There is no significant difference between teachers' and school administrators' perceptions of ethical and policy concerns regarding AI integration.

Table 10: T-test Analysis of Difference between Teachers' and School Administrators' Perceptions of Ethical and Policy Concerns Regarding AI Integration

Group	N	Mean	SD	df	t	p-value
Teachers'	240	3.23	0.79	358	0.962	0.337
Administrators'	120	3.19	0.76			

Decision: $p = 0.377 > 0.05 \rightarrow$ Fail to reject H_0

Interpretation

The independent samples t-test in table 10, reveal no statistically significant difference between teachers' and school administrators' perceptions of ethical, privacy, and policy concerns associated with artificial intelligence integration in secondary schools, t(358) = 0.962, p = .337. This indicate that both groups share similar views regarding issues such as data privacy protection, ethical AI use, policy guidance, and governance structures. The finding suggests a common awareness of ethical responsibilities across instructional and administrative roles, although the moderate mean scores imply that

existing ethical and policy frameworks require further strengthening to support responsible AI adoption in Ondo State secondary schools

Discussion

The findings revealed that respondents agreed that artificial intelligence provides significant opportunities for enhancing teaching and school management, as indicated by the high grand mean (3.28). This suggests that both teachers and administrators perceive AI as useful for improving instructional delivery, student engagement, and administrative efficiency.This finding is consistent with Holmes et al. (2019) and Zawacki-Richter et al. (2019), who reported that AI enhances personalized learning and educational effectiveness. Similarly, Olaiya et al. (2025) found that teachers perceive AI as beneficial for teaching and assessment.

The results showed that respondents agreed that major challenges hinder AI integration, including poor infrastructure, high cost, limited technical skills, and unreliable power supply (grand mean = 3.29). This finding aligns with Ogunode et al. (2023) and World Bank (2022), who identified infrastructural deficits and funding limitations as key barriers to digital technology adoption in Nigerian schools. It also supports UNESCO (2021), which emphasized limited access to ICT resources in developing contexts.

The findings indicated a moderate level of preparedness (grand mean = 3.08), suggesting that although respondents show willingness to adopt AI, institutional readiness in terms of funding, training, and policy remains inadequate. This is consistent with Ghimire and Edwards (2024) and Olaiya et al. (2025), who reported that teachers' willingness does not necessarily translate into readiness due to lack of institutional support and training.

The findings revealed that respondents perceived AI as having a positive impact on teaching and learning outcomes (grand mean = 3.27), particularly in improving engagement, performance, and instructional effectiveness. This supports Luckin et al. (2016) and Holmes and Tuomi (2022), who found that AI enhances learning outcomes through personalized and adaptive instruction.

The results showed that respondents acknowledged ethical and policy concerns associated with AI integration (grand mean = 3.22), particularly regarding data privacy, fairness, and governance. This finding agrees with UNESCO (2021) and Nguyen et al. (2023), who emphasized that ethical considerations are critical in the adoption of AI in education.

The findings revealed no significant difference between teachers and administrators ($p > 0.05$), indicating similar perceptions of AI opportunities in school management. This supports previous studies (Zawacki-Richter et al., 2019; Olaiya et al., 2025), which found that educators generally share positive perceptions of AI regardless of role.

The result showed no significant difference between teachers and administrators ($p > 0.05$), suggesting a shared understanding of AI's role in teaching. This is consistent with Holmes et al. (2019), who reported that both instructional and administrative stakeholders recognize the benefits of AI in education.

The findings indicated no significant difference ($p > 0.05$), implying that both groups experience similar challenges in AI adoption. This aligns with Ogunode et al. (2023), who reported that challenges such as infrastructure and technical capacity affect all stakeholders equally.

The result showed no significant difference ($p > 0.05$), indicating that both teachers and administrators exhibit similar levels of preparedness. This supports Ghimire and Edwards (2024), who found that institutional readiness affects all school actors uniformly.

The findings revealed no significant difference ($p > 0.05$), suggesting that both groups equally perceive the positive impact of AI. This is consistent with Luckin et al. (2016), who emphasized widespread recognition of AI's benefits in education.

The result showed no significant difference ($p > 0.05$), indicating that both teachers and administrators share similar concerns about ethical and policy issues. This aligns with UNESCO (2021), which highlights that ethical awareness of AI is common among educational stakeholders.

CONCLUSION

This study examined teachers' and school administrators' perceptions of the opportunities, challenges, readiness, and ethical concerns associated with the integration of Artificial Intelligence (AI) in secondary school education in Ondo State, Nigeria. The findings revealed that both teachers and administrators recognize the potential of AI to enhance teaching, learning, assessment, and school management. However, the study also identified significant barriers to effective AI adoption, including inadequate ICT infrastructure, unreliable internet connectivity, insufficient funding, limited technical expertise, and unstable electricity supply. The results further showed that schools' readiness for AI integration is moderate, indicating that while awareness of AI is increasing, many institutions lack the structural and professional capacity required for full implementation. Overall, the study concludes that although AI holds considerable promise for improving educational outcomes, its effective adoption requires coordinated investments in infrastructure, teacher capacity development, and clear ethical and policy frameworks.

Recommendation

The study recommends that government and educational stakeholders prioritize investment in ICT infrastructure, reliable internet connectivity, and stable electricity supply in secondary schools. Regular professional development programmes should be organized to improve teachers' digital competence and capacity to integrate AI tools into teaching and learning. Education authorities should also

develop clear policies and ethical guidelines to regulate AI use in schools. Furthermore, pilot AI initiatives should be implemented in selected schools to test scalable and context-appropriate models for wider adoption.

Suggestions for Future Studies

Future research should examine the impact of specific AI tools on students' learning outcomes using experimental or mixed-method designs. Comparative studies between public and private schools, as well as longitudinal studies across different Nigerian states, are also recommended.

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