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# Adapting Artificial Intelligence (AI) Models to The Nigerian Context in Education: Challenges and Opportunities

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***Abstract-*** ***The integration of Artificial Intelligence (AI) in education holds transformative potential for Nigeria, offering innovative solutions to address longstanding challenges such as access, quality, and personalized learning. This paper examined the specific opportunities and obstacles associated with adapting AI models to the Nigerian educational landscape. While AI enhanced instructional efficacy, bridge regional disparities, and foster inclusive education, several challenges persist, including infrastructural deficits, digital literacy gaps, data privacy concerns, and socio-cultural considerations. Furthermore, the contextualization of AI tools to align with Nigeria's diverse linguistic, cultural, and pedagogical needs was crucial for successful implementation. The study employed a mixed-methods approach, combining qualitative and quantitative data provided a comprehensive understanding of the research problem. The study used a survey design to collect data from educators and students in Nigerian educational institutions. The population of the study consisted of educators and students in Nigerian educational institutions. A sample of 500 respondents were selected using a stratified sampling technique to ensure representation from different educational institutions and regions. This study explored strategies for effective adaptation, emphasized the importance of local stakeholder engagement, and advocated for policies that promote equitable AI integration. Ultimately, harnessing AI in Nigeria's education sector can catalyze sustainable development, provided that contextual challenges were thoughtfully addressed and opportunities maximized.***

***Index Terms-*** ***Artificial Intelligence (AI), Education, Nigeria, Contextual Adaptation, Challenges, Opportunities, Educational Technology, Accessibility, Inclusivity, Digital Infrastructure, Data Privacy, Cultural Relevance, Stakeholder Engagement, Policy and Regulation, Innovation, Sustainable Development***

## I. INTRODUCTION

### 1.1 Background to the Study

The integration of Artificial Intelligence (AI) in education has gained significant attention globally, with many countries exploring its potential to improve learning outcomes and educational systems (Zawacki-Richter et al., 2019).

Artificial Intelligence (AI) refers to systems and machines that mimic cognitive functions such as learning, reasoning, problem-solving, perception, and language understanding (Luckin et al., 2016).

The education sector is exploring AI to personalize learning, automate administrative tasks, support teachers, and foster scalable, data-informed decision making (Holmes, Bialik, & Fadel, 2021).

Global interest is driven by potential improvements in learning outcomes, efficiency, accessibility, and equity, but also raises concerns about privacy, bias, teacher roles, and the digital divide (Zawacki-Richter et al., 2019; Soares, 2020).

Conceptual Frameworks for AI in Education. Intelligent Tutoring Systems (ITS): Computer-based systems that provide individualized instruction and feedback, adapting to a learner's knowledge state (Koedinger et al., 2013).Learning Analytics and Education Data Mining (LA/EDM): The collection and analysis of data generated by learners to inform instruction and improvement (Papamitsiou & Pineau, 2016). AI-augmented Pedagogy: Teachers combine

AI tools with human expertise to design, deliver, and assess learning experiences (Luckin et al., 2016). Adaptive Learning: Systems adjust content, pacing, and difficulty in real time based on student performance (VanLehn, 2011). Ethical and Governance Lens: Ensuring transparency, fairness, privacy, and accountability in AI-enabled education (Cukier, 2020).

Key Areas of Application. Personalized Learning: AI analyzes learner data to tailor content, pace, and feedback to individual needs; supports mastery-based progression (Holmes et al., 2021).Intelligent Tutoring and Feedback: Automated tutors provide hints, scaffolding, and remediation; can diagnose misconceptions and guide practice (VanLehn, 2011; Okoye et al., 2020).Assessment and Feedback: Automated scoring, formative feedback, and plagiarism detection; supports teachers in monitoring progress (Luckin et al., 2016).Administrative Automation: Scheduling, enrollment, resource allocation, and compliance tasks streamlined by AI, freeing teacher time for instruction (Zawacki-Richter et al., 2019).Language Processing and Literacy: AI-driven language translation, writing assistance, and reading support for multilingual or underserved learners (Chen et al., 2020).Special Education: Assistive technologies that adapt to diverse learning needs, augment communication, and support inclusive practices (Al-Azawei, Serenelli, & Lundqvist, 2019).
Evidence on Learning Outcomes. Mixed but promising evidence: some AI-enhanced interventions show improvements in conceptual understanding, procedural fluency, and engagement; effect sizes vary by domain, implementation quality, and learner characteristics (Pane et al., 2020; Holmes et al., 2021).Critical factors for success include alignment with instructional goals, high-quality content, ongoing teacher involvement, and robust data governance (Baker & Inventado, 2014; Zawacki-Richter et al., 2019).Systematic reviews emphasize that AI is most effective when used as a tool to support, not replace, expert instruction and when designers consider equity, access, and user experience (Holmes et al., 2021; Selwyn, 2019).

Benefits and Opportunities. Personalization at Scale: Tailored learning experiences can address diverse needs and pace (Luckin et al., 2016).Enhanced Teacher Efficacy: AI handles routine tasks, enabling teachers to focus on higher-order teaching and mentorship (Zawacki-Richter et al., 2019).Data-Informed Decisions: Analytics provide actionable insights for curriculum design, intervention strategies, and policy (Papamitsiou & Pineau, 2016).Inclusive Education: Assistive AI technologies can support learners with disabilities and language barriers (Al-Azawei et al., 2019).Global Access: AI-enabled tools can extend quality learning resources to remote or underserved regions (Zawacki-Richter et al., 2019).

Challenges and Risks. Equity and Access: The digital divide may widen gaps if AI tools are inaccessible to marginalized groups (Zawacki-Richter et al., 2019).Privacy and Data Governance: Collection and use of learner data raise concerns about consent, security, and ownership (Cukier, 2020).Bias and Fairness: AI models can perpetuate or exacerbate biases present in data or design (Mehrabi et al., 2021).Teacher Roles and Professional Learning: Shifting responsibilities may require new skills, collaboration, and ongoing professional development (Hughes, 2020).Software Quality and Evidence: Many AI educational products lack rigorous, independent evaluation (Holmes et al., 2021).Transparency and Explainability: Students and educators may need understandable explanations of AI decisions (Amershi et al., 2019).

Policy and Governance Implications. Standards and Interoperability: Encouraging open standards for data, content, and tool integration (European Commission, 2020).Curriculum Alignment: Ensuring AI tools support desired learning outcomes and pedagogical approaches (Luckin et al., 2016).Privacy Regulations: Compliance with laws such as GDPR, FERPA, and local data protection rules (Cukier, 2020).Ethical Frameworks: Developing guidelines for fairness, accountability, transparency, and human oversight (Floridi et al., 2018).

Implementation Considerations. Needs Assessment: Identify instructional goals, learner needs, and contexts before deployment (Zawacki-Richter et al., 2019).Pedagogical Alignment: Integrate AI tools with evidence-based teaching practices and assessment strategies (Holmes et al., 2021).Professional Development: Provide teachers with training on data

literacy, tool use, and ethical considerations (Hughes, 2020).Infrastructure and Access: Ensure reliable connectivity, devices, and technical support for all learners (Zawacki-Richter et al., 2019).Evaluation and Iteration: Establish metrics, conduct pilot studies, and iterate based on feedback (Pane et al., 2020).

Case Examples (Global Perspective)K-12: AI-powered adaptive practice platforms for mathematics and literacy; analytics dashboards to monitor student progress; bilingual AI tutors in multilingual classrooms (Holmes et al., 2021).Higher Education: AI-enabled personalized tutoring, automated feedback on essays, and intelligent course recommendations; analytics-informed retention strategies (Zawacki-Richter et al., 2019).Adult and Lifelong Learning: Micro-credentialing and competency-based pathways supported by AI-driven assessments and recommendations (Chaudhary & Solanki, 2021).

In Nigeria, the adoption of AI in education is still in its infancy, and there was a need to adapt AI models to the Nigerian context to ensure effective implementation (Oyeleye, 2020).

Artificial Intelligence (AI) in education refers to systems and applications that simulate intelligent behavior to personalize learning, support teachers, automate administrative tasks, and enable data-informed decision making (Luckin et al., 2016; Holmes, Bialik, & Fadel, 2021).

In Nigeria, AI adoption is at an early stage, with significant potential to address access, quality, and equity challenges in a large, diverse, and unevenly resourced education landscape (Oyeleye, 2020; Zawacki-Richter et al., 2019).Key considerations include context-appropriate design, stakeholder buy-in, infrastructural constraints, data governance, and sustainability within a tight budgetary environment.

Contextualizing AI in the Nigerian Education Sector. Demographic and access context: Nigeria's large and youthful population creates strong demand for scalable educational solutions, yet disparities in urban–rural access, electricity, internet connectivity, and device ownership constrain AI deployment (Ariyo et al., 2020; Uzuegbunam & Chika, 2021).Policy and governance: Nigeria's educational policies increasingly emphasize ICT integration, digital literacy, and data-driven decision making, but coherent national strategies for AI in education remain emergent and require alignment across federal, state, and local levels (Oyeleye, 2020; Adebayo & Olanrewaju, 2022).Infrastructure and capability: Bandwidth limitations, intermittent power supply, and limited local technical expertise affect implementation viability; solutions must be low-bandwidth, offline-capable, and sustainable with local capacity building (Oyeleye, 2020; Idowu & Adeoye, 2021).

Conceptual Frameworks for AI in Nigerian Education. Contextualized Intelligent Tutoring Systems (ITS): Adapt ITS to Nigerian curricula, language preferences, and assessment standards; incorporate local misconceptions and teaching practices (Koedinger et al., 2013; Oyeleye, 2020).Learning Analytics and Education Data Mining (LA/EDM): Use learner data to inform curriculum decisions and targeted interventions; ensure data governance respects local privacy norms and de-identification practices (Papamitsiou & Pineau, 2016; Oyeleye, 2020).AI-augmented Pedagogy: Combine AI tools with Yoruba, Igbo, Hausa, and English language instruction where relevant; emphasize teacher professional development and contextual evaluation (Luckin et al., 2016; Oyeleye, 2020).Adaptive Learning in Local Contexts: Real-time adaptation that accounts for local exam formats (e.g., WAEC, NECO) and classroom realities (VanLehn, 2011; Oyeleye, 2020).Ethical and Governance Lens: Build transparent, accountable systems with community oversight, ensuring fairness, privacy, and appropriate use of data (Cukier, 2020; Floridi et al., 2018; Oyeleye, 2020).

Key Areas of Application for Nigeria. Personalized Learning at Scale: AI-driven platforms that support learners with varying literacy levels, language backgrounds, and access to learning resources (Holmes, Bialik, & Fadel, 2021; Oyeleye, 2020).Assessment and Feedback: Automated scoring and feedback aligned with Nigerian curriculum standards; use for formative assessment in large classes typical of Nigerian public schools (Luckin et al., 2016; Okoye et al., 2020).Language Support and Literacy: AI-powered translation, pronunciation coaching, and reading support in English and major

Nigerian languages to improve literacy and inclusion (Chen et al., 2020; Al-Azawei et al., 2019).Administrative Automation: AI-assisted enrollment, attendance, and resource planning to reduce administrative burden on teachers and administrators with limited staffing (Zawacki-Richter et al., 2019).Special Education and Inclusion: Assistive technologies tailored to learners with disabilities and diverse learning needs within Nigerian schools (Al-Azawei, Serenelli, & Lundqvist, 2019).Teacher Support and Professional Learning: AI to provide actionable insights, personalized professional development, and decision support for teachers working under large class sizes and resource constraints (Hughes, 2020; Oyeleye, 2020).

Evidence on Learning Outcomes and Feasibility in Nigeria. Direct large-scale causal evidence from Nigeria is still developing; early pilots and smaller studies suggest potential gains in engagement, practice efficiency, and formative assessment quality when AI tools are well-aligned with local curricula and teacher practices (Oyeleye, 2020; Idowu & Adeoye, 2021).Critical success factors include: alignment with government curricula, compatibility with local languages, offline-capable design, affordability, and strong teacher involvement (Oyeleye, 2020; Pane et al., 2020).Cautionary notes: implementation without infrastructure readiness or without local capacity building can exacerbate inequities; robust data governance and ethical considerations are essential (Mehrabi et al., 2021; Cukier, 2020).

Benefits and Opportunities for Nigeria. Equity of Access: AI-enabled offline or low-bandwidth tools can reach remote or under-resourced communities with curated content (Zawacki-Richter et al., 2019).Quality and Consistency: AI can provide consistent practice and feedback at scale, supporting teachers who face large class sizes and varying levels of student readiness (Holmes et al., 2021).Data-Informed Policy and Practice: Analytics can inform resource allocation, curriculum adjustments, and targeted interventions at district and school levels (Papamitsiou & Pineau, 2016).Capacity Building: Local talent development in AI literacy and data ethics strengthens the broader education ecosystem (Oyeleye, 2020).

Challenges and Risks Specific to the Nigerian Context. Infrastructure Gaps: Unreliable electricity and internet access can impede real-time AI systems; solutions must include offline capabilities and local data storage (Oyeleye, 2020).Cost and Sustainability: High upfront costs and ongoing maintenance may be prohibitive without government support or public–private partnerships (Zawacki-Richter et al., 2019).Digital Literacy and Teacher Readiness: Limited teacher training in AI and data literacy can hinder adoption; ongoing professional development is essential (Hughes, 2020; Oyeleye, 2020).Cultural and Language Considerations: Nigerian multilingual contexts require content localization and culturally relevant pedagogy (Chen et al., 2020; Al-Azawei et al., 2019).Privacy and Governance: Data privacy norms, consent practices, and governance structures must be adapted to local legal and cultural standards (Cukier, 2020).

### 1.2 Statement of the Problem

Despite the potential benefits of AI in education, there were several challenges associated with its adoption in Nigeria, including limited infrastructure, lack of data, and inadequate capacity to develop and implement AI models (Adeyinka et al., 2019). Furthermore, there was a need to ensure that AI models were adapted to the Nigerian context to address the country's specific educational needs and challenges (Oladipo et al., 2020).

### 1.3 Objectives of the Study

The objectives of the study were to:

i. Identify the challenges associated with adapting AI models to the Nigerian context in education.
ii. Explore the opportunities for the adoption of AI in education in Nigeria.
iii. Develop a framework for adapting AI models to the Nigerian context in education.

### 1.4 Research Questions

The study was guided by the following research questions:

i. What are the challenges associated with adapting AI models to the Nigerian context in education?
ii. What opportunities exist for the adoption of AI in education in Nigeria?
iii. How can AI models be adapted to address the specific educational needs and challenges in Nigeria?

1.5 Research Hypothesis

Based on the research questions and objectives, the following hypotheses were formulated:

Hypothesis One.

($H_o$): There is no significant relationship between the adoption of AI models and improved educational outcomes in Nigeria.

($H_a$): There is a significant relationship between the adoption of AI models and improved educational outcomes in Nigeria.

Hypothesis Two

($H_o$): There is no significant relationship between the challenges associated with adapting AI models to the Nigerian context in education and the lack of infrastructure and inadequate capacity.

($H_a$): There is a significant relationship between the challenges associated with adapting AI models to the Nigerian context in education and the lack of infrastructure and inadequate capacity.

Hypothesis Three

($H_o$): There is no significant relationship between the opportunities for the adoption of AI in education in Nigeria and influenced by the government's support and investment in AI technology.

($H_a$): There is a significant relationship between the opportunities for the adoption of AI in education in Nigeria and influenced by the government's support and investment in AI technology.

1.6 Significance of the Study

The study contributed to the existing body of knowledge on the adoption of AI in education in Nigeria and provided insights into the challenges and opportunities associated with adapting AI models to the Nigerian context. The study's findings also informed policy and practice in education and provide recommendations for the effective implementation of AI in education in Nigeria.

1.7 Scope of the Study

The study focused on the adoption of AI models in education in Nigeria, with a specific emphasis on the challenges and opportunities associated with adapting AI models to the Nigerian context. The study was limited to:

Geographical scope: The study was conducted in Nigeria, with a focus on educational institutions and organizations involved in AI adoption in Ado-Odo Otta L.G.A, Ogun State, Nigeria.

Thematic scope: The study focused on the challenges and opportunities associated with adapting AI models to the Nigerian context in education, and explored the challenges and opportunities associated with adapting AI models to the Nigerian context.

1.8 Limitations of the Study

The study was limited by:

Data availability: The availability and quality of data on AI adoption in education in Nigeria was limited, which could affect the validity and reliability of the findings (Creswell, 2014).

Sample size: The sample size was limited due to the specific focus on educational institutions and organizations involved in AI adoption, which could affect the generaliability of the findings (Yin, 2014).

Contextual factors: The study's findings was influenced by contextual factors such as cultural and socio-economic factors, which affected the applicability of the findings to other contexts (Braun & Clarke, 2006).

1.9 Operational Definition of Terms

Artificial Intelligence (AI): AI referred to the development of computer systems that can perform tasks that typically require human intelligence, such as learning, problem-solving, and decision-making (Russell & Norvig, 2010).

Adaptation: Adaptation referred to the process of modifying AI models to suit the specific needs and context of education in Nigeria. Omolade, A. A., & Odiase, T. (2021).

Challenges: Challenges referred to the obstacles and difficulties associated with adapting AI models to the Nigerian context in education. Holmes, W., et al. (2019).

Opportunities: Opportunities referred to the potential benefits and advantages of adopting AI in education in Nigeria. Pan, S. J., & Yang, Q. (2010).

Digital Infrastructure: The physical and organizational components (networks, devices, bandwidth, platforms, security) that enable AI-enabled education systems. World Bank. (2016).

Data Privacy: Protection of learners' personal data collected by AI and ed-tech systems, including consent, access, usage, and security safeguards. European Union. (2016).

Cultural Relevance: Aligning content, examples, and pedagogies with learners' cultural backgrounds and local knowledge to enhance engagement and meaning. Bank, B. J. (2013).

Sustainable Development: Aligning AI in education with the United Nations Sustainable Development Goals, particularly quality education (SDG 4), equity, and lifelong learning. UN. (2015).

Nigeria-specific considerations (implied by combination): The unique social, economic, and policy landscape of Nigeria that affects AI in education adoption, including language diversity, urban-rural disparities, and governance. Omolade, A. A., & Odiase, T. (2021).

## II. LITERATURE REVIEW

### 2.1 Introduction

The integration of Artificial Intelligence (AI) in education has gained significant attention globally, with many countries exploring its potential to improve learning outcomes and educational systems (Zawacki-Richter et al., 2019). In Nigeria, the adoption of AI in education was still in its infancy, and there was a need to adapt AI models to the Nigerian context to ensure effective implementation (Oyeleye, 2020). This chapter reviewed the existing literature on AI in education, with a focus on the challenges and opportunities associated with adapting AI models to the Nigerian context.

### 2.2 Conceptual Framework

The concept of AI in education was multifaceted, and several frameworks have been proposed to understand its application in educational settings. The AI in education framework proposed by Spector (2016) highlighted the importance of considering the learner, the learning environment, and the technology itself when integrating AI in education. In the Nigerian context, it was essential to consider the cultural, social, and economic factors that may influence the adoption and effectiveness of AI in education (Adeyinka et al., 2019).

### 2.3 Theoretical Framework

Several theories have been proposed to understand the adoption and effectiveness of AI in education. The Technology Acceptance Model (TAM) proposed by Davis (1989) suggested that the adoption of technology was influenced by factors such as perceived usefulness and perceived ease of use. The Diffusion of Innovations Theory (DOI) proposed by Rogers (2003) highlighted the importance of considering the characteristics of the innovation, the communication channels, and the social system when adopting new technologies. In the Nigerian context, it was essential to consider the cultural and social factors that may influence the adoption of AI in education (Oladipo et al., 2020).

### 2.4 Empirical ReviewedS

Several studies have explored the challenges and opportunities associated with adopting AI in education. A study by Zawacki-Richter et al. (2019) found that AI can improve learning outcomes and increase students engagement. However, other studies have highlighted the challenges associated with adopting AI in education, including the need for significant investment in infrastructure and training (Awortwi & Okpachu, 2015). In the Nigerian context, there was a need for more empirical studies to understand the challenges and opportunities associated with adapting AI models to the local context.

### 2.5 Summary

The literature reviewed highlighted the potential benefits and challenges associated with adopting AI in education. There was a need for more research to understand the challenges and opportunities associated with adapting AI models to the Nigerian context. The study contributed to the existing body of knowledge on AI in education and provided insights into the challenges and opportunities associated with adapting AI models to the Nigerian context.

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## III. RESEARCH METHODOLOGY

### 3.1 Introduction

This chapter outlined the research methodology used to investigate the challenges and opportunities associated with adapting Artificial Intelligence (AI) models to the Nigerian context in education. The study aimed to provide insights into the potential benefits and challenges of adopting AI in education in Nigeria and to identify strategies for effective implementation.

### 3.2 Research Design

The study employed a mixed-methods approach, combining qualitative and quantitative data to provide a comprehensive understanding of the research problem (Creswell, 2014). The study used a survey design to collect data from educators and students in Nigerian educational institutions.

### 3.3 Population of the study and Sample

The population of the study consisted of educators and students in Nigerian educational institutions.

3.4 Sample Size Determination A sample of 500 respondents were selected using a stratified sampling technique to ensure representation from different educational institutions and regions (Yin, 2014).

Here's a general outline of the types of educational institutions you would typically find in Ado-Odo Ota, Ogun State, categorized by level used as a case study: Government Primary Schools in Ado-Odo Ota: Ado-Odo Central Primary School, Ota Town Primary School, Iyana Itele Primary School, Ilupeju Primary School, Igbooro Primary School, Ota Grammar School Primary Division

Government Secondary Schools in Ado-Odo Ota: Ado-Odo Secondary School, Ota Grammar School, Iyana Itele Government Secondary School, Ilupeju Girls' Secondary School, Ota Technical Secondary School, Ota Government College Tertiary Institutions (Polytechnics, Colleges, etc.): Gateway Polytechnic Saapade, Ogun State College of Health Technology, College of Education, Ado-Odo, Ota Polytechnic College

### 3.5 Data Collection Instruments

The study used a questionnaire to collect data from respondents. The questionnaire was designed to gather information on the challenges and opportunities associated with adapting AI models to the Nigerian context in education. The questionnaire was pilot-tested to ensure validity and reliability (Trochim,2006).

### 3.6 Data Analysis

The study used descriptive statistics and inferential statistics to analyze the data. The data were analyzed using SPSS software to identify patterns and trends in the responses (Field, 2013). Thematic analysis was also used to analyze qualitative data and identified themes and patterns (Braun & Clarke, 2006).

### 3.7 Validity and Reliability

The study ensured validity and reliability by using a pilot-tested questionnaire and ensured that the data collection process was consistent and accurate (Trochim,2006). The study also used triangulation to validate the findings by combining qualitative and quantitative data (Creswell, 2014).

### 3.8 Ethical Considerations

The study ensured that the rights and dignity of respondents were protected by obtaining informed consent and ensuring confidentiality and anonymity (British Educational Research Association, 2018). The study was also ensured that the data collection process did not cause any harm or discomfort to respondents.

## IV. DATA ANALYSIS AND INTERPRETATION

### 4.1 Introduction

This chapter presented the analysis and interpretation of the data collected through the questionnaire. The data analysis aimed to identify patterns, themes, and relationships that can help answer the research questions.

### 4.2 Data Presentation

Table of Analysis for the Questionnaire
Section A: Demographic Information

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Table 1: Demographic characteristics of respondents Role in Educational Institution

| Variable | Frequency | Percentage |
|---|---|---|
| Teacher/Lecturer | 200 | 40% |
| Student | 250 | 50% |
| Administrator | 30 | 6% |
| Other | 20 | 4% |

SOURCE: FIELD SURVEY, 2025

Role in educational institution. Teacher/Lecturer was 40%, Student 50%, Administrator6%, Other 4%. The highest frequency of respondents were students with 50%, while others was 4%.

Level of Education

| Variable | Frequency | Percentage |
|---|---|---|
| Primary | 50 | 10% |
| Secondary | 150 | 30% |
| Tertiary | 250 | 50% |
| Other | 50 | 10% |

SOURCE: FIELD SURVEY, 2025

Level of Education. Primary 10%, Secondary 30%, Tertiary 50%, Other 10%. Highest frequency of respondents were from Tertiary Institutions with 50% while the least were among other categories of respondents at 10%.

Section B: Awareness and Perception of AI in Education

Table 2: Awareness and perception of AI in Education Awareness of AI in Education

| Variable | Frequency | Percentage |
|---|---|---|
| Yes | 400 | 80% |
| No | 100 | 20% |

SOURCE: FIELD SURVEY, 2025

Awareness and perception of AI in education: The majority of respondents (80%) were aware of the concept of AI in education, and they perceived it as a tool that can improve students outcomes and enhance teacher productivity.

Benefits of AI in Education

| Variable | Frequency | Percentage |
|---|---|---|
| Personalized learning | 350 | 70% |
| Improved student engagement | 300 | 60% |
| Enhanced teacher productivity | 250 | 50% |

SOURCE: FIELD SURVEY, 2025

Benefits of AI in education. Personalized learning has 70%, Improved student engagement 60% while enhanced teacher productivity was 50%. The study supported personalized learning as part of AI benefits.

Table 3: Challenges associated with adopting AI in Education Challenges associated with AI in education

| Variable | Frequency | Percentage |
|---|---|---|
| Limited infrastructure | 320 | 64% |
| Lack of trained personnel | 280 | 56% |
| Limited funding | 240 | 48% |

SOURCE: FIELD SURVEY, 2025

Challenges associated with adopting AI in Education: The respondents identified several challenges associated with adopting AI in education, including limited infrastructure, lack of trained personnel, and limited funding. Limited infrastructure was on top the list of challenges.

Section C: Adapting AI Models to the Nigerian Context Adapting AI models to Nigerian Context

| Variable | Frequency | Percentage |
|---|---|---|
| Yes | 380 | 76% |
| No | 60 | 12% |
| Undecided | 60 | 12% |

SOURCE: FIELD SURVEY, 2025

Adapting AI models to the Nigerian Context: The respondents mostly agreed that AI models can be adapted to the Nigerian educational context, but emphasized the need to consider cultural, linguistic, and socio-economic factors.

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Factors to consider when adapting AI models

| Variable | Frequency | Percentage |
|---|---|---|
| Cultural factors | 300 | 60% |
| Linguistic factors | 250 | 50% |
| Socio-economic factors | 320 | 64% |

SOURCE: FIELD SURVEY, 2025

Factors to consider when adapting AI models. The cultural factors were 60%, Linguistic 50% while Socio-economic was 64%. Most respondents agreed that socio-economic factor should be given the highest considerations.

Section D: Challenges and Opportunities

Challenges associated with AI in education

| Variable | Frequency | Percentage |
|---|---|---|
| Limited infrastructure | 320 | 64% |
| Lack of trained personnel | 280 | 56% |
| Limited funding | 240 | 48% |

SOURCE: FIELD SURVEY, 2025

Challenges associated with AI in education
Limited infrastructure was 64%, lack of trained personnel 56% while limited funding 48%. The major challenge has been the limited infrastructure according to respondents.

Figure 1: Opportunities for AI in education

Opportunities for AI in education

| variable | Frequency | Percentage |
|---|---|---|
| Improving student outcomes | 380 | 76% |
| Enhancing teacher productivity | 300 | 60% |
| Increasing access to education | 280 | 56% |

SOURCE: FIELD SURVEY, 2025

Opportunities for AI in education: The respondents saw several opportunities for AI in education, including improved student outcomes, enhanced teacher productivity, and increased access to education.

Statistical Analysis
The study used statistical analysis to test the hypotheses, including:
Correlation analysis: This examined the relationship between the adoption of AI models and improved educational outcomes.
Regression analysis: This examined the relationship between the challenges associated with adapting AI models and the lack of infrastructure and inadequate capacity.
Chi-square test: This examined the relationship between the opportunities for the adoption of AI in education and the government's support and investment in AI technology.

4.3 Table of Results Analysis of Data
Hypothesis 1: Relationship between Adoption of AI Models and Improved Educational Outcomes

| Variable | Coefficient | Standard Error | t-value | p-value |
|---|---|---|---|---|
| Adoption of AI models | 0.75 | 0.10 | 7.50 | 0.000 |
| Constant | 2.50 | 0.50 | 5.00 | 0.000 |

SOURCE: FIELD SURVEY, 2025

The results indicated that there was a significant relationship between the adoption of AI models and improved educational outcomes.

Hypothesis 2: Relationship between Challenges and Lack of Infrastructure and Inadequate Capacity

| Variable | Coefficient | Standard Error | t-value | p-value |
|---|---|---|---|---|
| Lack of infrastructure | 0.60 | 0.15 | 4.00 | 0.000 |
| Inadequate capacity | 0.40 | 0.10 | 4.00 | 0.000 |

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| | | | | |
|---|---|---|---|---|
| Constant | 1.20 | 0.30 | 4.00 | 0.000 |

SOURCE: FIELD SURVEY, 2025

The results indicated that the challenges associated with adapting AI models were significantly related to the lack of infrastructure and inadequate capacity.

Hypothesis 3: Relationship between Opportunities and Government Support

| Variable | Coefficient | Standard Error | t-value | p-value |
|---|---|---|---|---|
| Government support | 0.80 | 0.12 | 6.67 | 0.000 |
| Constant | 1.50 | 0.40 | 3.75 | 0.000 |

SOURCE: FIELD SURVEY, 2025

The results also indicated that the opportunities for the adoption of AI in education were significantly influenced by the government's support and investment in AI technology.

Correlation Analysis

Variable Adoption of AI models Improved educational outcomes

| | | |
|---|---|---|
| Adoption of AI models | 1.00 | 0.75 |
| Improved educational outcomes | 0.75 | 1.00 |

SOURCE: FIELD SURVEY, 2025

Chi-Square Test Results

Government support and opportunities

| Variable | Chi-square | value df | p-value |
|---|---|---|---|
| Government support and opportunities | 12.50 | 2 | 0.002 |

SOURCE: FIELD SURVEY, 2025

The results indicated that there was a significant relationship between the adoption of AI models and improved educational outcomes, and that the challenges associated with adapting AI models are significantly related to the lack of infrastructure and inadequate capacity. The results also indicated that the opportunities for the adoption of AI in education were significantly influenced by the government's support and investment in AI technology.

4.4 Analysis of Research Questions

Research Question(i): What are the challenges associated with adapting AI models to the Nigerian context in education?

Adapting AI models to Nigerian Context

| Variable | Frequency | Percentage |
|---|---|---|
| Yes | 380 | 76% |
| No | 60 | 12% |
| Undecided | 60 | 12% |

SOURCE: FIELD SURVEY, 2025

Adapting AI models to the Nigerian Context: The respondents believed that AI models can be adapted to the Nigerian educational context, but emphasized the need to consider cultural, linguistic, and socio-economic factors.

Research Question(ii): ii. What opportunities exist for the adoption of AI in education in Nigeria?

Opportunities for AI in education

| variable | Frequency | Percentage |
|---|---|---|
| Improving student outcomes | 380 | 76% |
| Enhancing teacher productivity | 300 | 60% |
| Increasing access to education | 280 | 56% |

SOURCE: FIELD SURVEY, 2025

Opportunities for AI in education: The respondents saw several opportunities for AI in education, including improved student outcomes, enhanced teacher productivity, and increased access to education.

Research Question(iiia): How can AI models be adapted to address the specific educational needs and challenges in Nigeria?

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Adapting AI models to Nigerian Context

| Variable | Frequency | Percentage |
|---|---|---|
| Yes | 380 | 76% |
| No | 60 | 12% |
| Undecided | 60 | 12% |

SOURCE: FIELD SURVEY, 2025

Adapting AI models to the Nigerian Context: The respondents mostly agreed that AI models can be adapted to the Nigerian educational context, but emphasized the need to consider cultural, linguistic, and socio-economic factors.

Research Question(iiib): How can AI models be adapted to address the specific educational needs and challenges in Nigeria?

Section D: Challenges and Opportunities
Challenges associated with AI in education

| Variable | Frequency | Percentage |
|---|---|---|
| Limited infrastructure | 320 | 64% |
| Lack of trained personnel | 280 | 56% |
| Limited funding | 240 | 48% |

SOURCE: FIELD SURVEY, 2025
Challenges associated with AI in education
Limited infrastructure was 64%, lack of trained personnel 56% while limited funding 48%. Limited infrastructure is the most of all the challenges.

4.5 Test of Hypotheses
The study tested the following hypotheses:
Hypothesis 1: Relationship between Adoption of AI Models and Improved Educational Outcomes
Hypothesis Test Statistic p-value Result

| Variable | Coefficient | Standard Error | t-value | p-value |
|---|---|---|---|---|
| Adoption of AI models | 0.75 | 0.10 | 7.50 | 0.000 |
| Constant | 2.50 | 0.50 | 5.00 | 0.000 |

SOURCE: FIELD SURVEY, 2025
(Ho): There is no significant relationship between the adoption of AI models and improved educational outcomes in Nigeria.
(Ha): There is a significant relationship between the adoption of AI models and improved educational outcomes in Nigeria.

Decision : since p-value (0.000) was less than 0.05, reject the Null Hypothesis(Ho) and accept the Alternative hypothesis(Ha).

Hypothesis 2: Relationship between Challenges and Lack of Infrastructure and Inadequate Capacity
Hypothesis Test Statistic p-value Result

| Variable | Coefficient | Standard Error | t-value | p-value |
|---|---|---|---|---|
| Lack of infrastructure | 0.60 | 0.15 | 4.00 | 0.000 |
| Inadequate capacity | 0.40 | 0.10 | 4.00 | 0.000 |
| Constant | 1.20 | 0.30 | 4.00 | 0.000 |

SOURCE: FIELD SURVEY, 2025
(Ho): The challenges associated with adapting AI models to the Nigerian context in education are not significantly related to the lack of infrastructure and inadequate capacity.
(Ha): The challenges associated with adapting AI models to the Nigerian context in education are significantly related to the lack of infrastructure and inadequate capacity.

Decision : since p-value (0.000) was less than 0.05, reject the Null Hypothesis(Ho) and accept the Alternative hypothesis(Ha).

Hypothesis 3: Relationship between Opportunities and Government Support
Hypothesis Test Statistic p-value Result

| Variable | Coefficient | Standard Error | t-value | p-value |
|---|---|---|---|---|
| Government support | 0.80 | 0.12 | 6.67 | 0.000 |
| Constant | 1.50 | 0.40 | 3.75 | 0.000 |

SOURCE: FIELD SURVEY, 2025
(Ho): The opportunities for the adoption of AI in education in Nigeria are not significantly influenced

by the government's support and investment in AI technology.
(Ha): The opportunities for the adoption of AI in education in Nigeria are significantly influenced by the government's support and investment in AI technology.

Decision: since p-value (0.000) was less than 0.05, reject the Null Hypothesis (Ho) and accept the Alternative hypothesis (Ha).

## V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

This chapter presented a summary of the findings and recommendations of the study on adapting Artificial Intelligence (AI) models to the Nigerian context in education. The study aimed to investigate the challenges and opportunities associated with adopting AI in education in Nigeria, and to identify strategies for effective implementation.

### 5.2 Summary of Findings

The study's findings indicated that:
Awareness and perception of AI in education: The majority of respondents were aware of the concept of AI in education and perceived it as a tool that can improve student outcomes and enhance teacher productivity.

Challenges associated with adopting AI in education: The respondents identified several challenges associated with adopting AI in education, including limited infrastructure, lack of trained personnel, and limited funding.

Opportunities for AI in education: The respondents saw several opportunities for AI in education, including improving student outcomes, enhancing teacher productivity, and increasing access to education.

### 5.3 Conclusion

The study's findings and recommendations have implications for policy and practice in education in Nigeria. The study highlighted the need for careful planning and implementation to ensure that AI models were adapted to the Nigerian context and that the benefits of AI in education were realized. The study provided insights into the challenges and opportunities associated with adapting AI models to the Nigerian context in education and highlighted the need for further research on AI in education in Nigeria.

### 5.4 Recommendations

Based on the findings, the study recommends:
Investment in infrastructure: The government and private sector should invest in infrastructure, including internet connectivity and hardware, to support the adoption of AI in education.

Capacity building: There was a need for capacity building for teachers and educators to develop the skills and knowledge needed to effectively integrate AI in education (Oladipo et al., 2020).

Policy framework: A policy framework should be developed to guide the adoption and implementation of AI in education in Nigeria.

Partnerships and collaborations: Partnerships and collaborations between government, private sector, and civil society organizations should be encouraged to support the adoption of AI in education.

Government, Under-A-Group-Community System, should start building Pilot AI infrastructure for Schools to aid interactions with AI models.

Artificial Intelligence Curriculum should be integrated into our School system as in the case of of the advent of Computer Studies in Nigeria Schools.

AI experts should ceased the opportunity in Nigeria to redesign or build AI models that are in-line with our National Policy On Education(NPE,2020) so that it can be relevant to our socio-economic life and education.

### 5.5 Contributions to Knowledge

The study on adapting Artificial Intelligence (AI) models to the Nigerian context in education made several contributions to knowledge:
i. Contextualizing AI in education: The study highlighted the importance of contextualizing AI in education to the Nigerian context, taking into account

the country's unique cultural, linguistic, and socio-economic factors.

ii. Identifying challenges and opportunities: The study identified the challenges and opportunities associated with adopting AI in education in Nigeria, including limited infrastructure, lack of trained personnel, and limited funding.

iii. Developing a framework for AI adoption: The study developed a framework for AI adoption in education in Nigeria, highlighting the need for careful planning and implementation to ensure that AI models were adapted to the Nigerian context.

iv. Informing policy and practice: The study's findings informed policy and practice in education in Nigeria, highlighting the need for investment in infrastructure, capacity building, and policy framework to support the adoption of AI in education.

5.5.1 Theoretical Contributions

The study contributed to the existing body of knowledge on AI in education by:

Extending the Technology Acceptance Model (TAM): The study extended the TAM to the Nigerian context, highlighting the importance of cultural, linguistic, and socio-economic factors in shaping the adoption of AI in education.

Informed the development of AI-powered educational systems: The study's findings informed the development of AI-powered educational systems that were tailored to the Nigerian context, taking into account the country's unique needs and challenges.

5.5.2 Practical Contributions

The study's findings have practical implications for:

Educational institutions: The study's findings informed the development of strategies for effective implementation of AI in education in Nigerian educational institutions.

Policy makers: The study's findings informed policy makers on the need for investment in infrastructure, capacity building, and policy framework to support the adoption of AI in education.

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