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Impact of AI-Driven Personalized Learning in Educational Systems on Policy Development

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Abstract:
The integration of AI-driven personalized learning within educational systems is transforming the landscape of policy development. This abstract explores the profound implications of these technologies on various educational policies, including curriculum design, assessment practices, and teacher training initiatives. Personalized learning models, powered by artificial intelligence, offering tailored educational experiences that cater to individual student needs, thereby enhancing engagement and academic achievement. As educators leverage data analytics and adaptive learning technologies, policymakers are prompted to rethink traditional frameworks to create adaptable, inclusive, and equitable educational environments. The findings will underscore the necessity for policies that facilitate the integration of AI tools while ensuring responsible use of data, equity in access, and support for teachers. This discourse will also highlight the importance of ongoing professional development for educators to navigate these innovations effectively. Ultimately, AI-driven personalized learning not only reshapes instructional methodologies but also necessitates a re-evaluation of policy structures to foster an ecosystem conducive to continuous improvement and innovation in education.

Keywords: *AI-Driven; Educational Systems; Impact, Learning; Personalized; and Policy Development*

I. Introduction

Recent happenings in the Nigerian educational sector from the introduction of the computer-based Test in the Unified Tertiary Matriculation Examinations (UTME) to the West African Senior School certificate Examinations (WASSCE) shows that there is the need for policy reforms most especially around AI personalized learning. AI has been widely recognized for its capability to personalize learning experiences. By analysing vast amounts of data, AI can tailor educational content to individual student needs, learning styles, and paces (Luckin et al., 2016). Studies have shown that personalized learning can significantly improve student engagement and achievement (Pane, Steiner, Baird, & Hamilton, 2015).

Personalized learning is an educational strategy that customizes instruction to the individual needs of every learner. This has picked up momentum with the arrival of AI. AI-powered personalized learning systems through the application smart algorithms to measure students' previous knowledge, learning pace, and interests, allowing dynamic content delivery that adjusts in real time (Usman et al., 2022; Ellikkal & Rajamohan, 2024).

One of the greatest benefits of AI-driven personalized learning is its ability to improve student performance. Studies have established that adaptive learning systems can enhance academic performance by detecting gaps in knowledge and offering specific interventions to fill them (Japiassu, 2022). Such systems guarantee that students understand core concepts before

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advancing to more complex subjects, hence minimizing learning differences among various learners.

Artificial Intelligence (AI) is transforming industries by the day, and education is no different. Among the most impactful uses of AI in education is the creation of adaptive learning systems, which adapt educational experiences for each student to their individual requirements. The systems employ machine learning algorithms, data analytics, and adaptive technologies to evaluate students' learning style, strengths, and weaknesses, deliver customized content, suggestions, and instant feedback. By taking advantage of AI, teachers are able to establish a more student-focused learning experience that improves both academic achievement and motivation. (Sadaf Saleem et al 2025)

As AI technology becomes more advanced, its use in education has further shown that its growth will provide even more intelligent and personalized learning experiences. Coming developments in AI-based education are likely to be more advanced natural language processing in intelligent tutoring systems, affect-aware AI that considers students' emotions, and fully immersive virtual reality (VR) learning environments providing highly interactive simulations (Shoaib et al., 2024). The use of AI has enabled worldwide learning programs through automated translation, increasing access to education for disparate linguistic and cultural populations (Chan & Ko, 2019).

AI plays a pivotal role in enabling data-driven decision-making and predictive analytics for student performance outcomes. Institutions leveraging AI-driven insights report increased effectiveness in operational management and personalized learning interventions (Satya & Mohammed, 2024). The world is moving at a fast pace and the educational sector in Nigeria must not be an exception. The events that played out during the COVID-19 lockdown where most educational institutions had to improvise to ensure continuity of their academic calendar is a pointer the AI driven personalised learning must be included in our learning curricula. This will help address the diverse learning needs of every student.

1.1 Problem Statement

The Nigerian educational system is at a critical juncture. The recent, large-scale adoption of technology in high-stakes examinations, such as the computer-Based Test (CBT) for the Unified Tertiary Matriculation Examination (UTME) and the West African Senior School Certificate Examination (WASSCE), signifies a shift towards digital integration. However, this integration is currently focused on assessment rather than learning. While these changes have improved examination efficiency and reduced malpractice, they have also exposed significant gaps in the system's readiness for a truly digital and personalized educational paradigm (Obasi & Msughter, 2025).

The core problem is that existing educational policies in Nigeria were not designed to accommodate the pedagogical shifts introduced by AI-driven personalized learning (AIPL). The current policy framework remains largely traditional, focusing on standardized curricula, one-size-fits-all instruction, and summative assessment models. This creates a disconnect between the potential of AI to address diverse learner needs—such as varying paces, learning styles, and knowledge gaps and the rigid structure of the current system.

As evidenced during the COVID-19 pandemic, the Nigerian educational system lacks a coherent framework for leveraging technology to ensure continuity and personalized instruction (Maradun & Aondover, 2025). Without deliberate policy reform, the adoption of AI in education risks being fragmented, inequitable, and ineffective. There is a lack of clear guidelines on data

privacy, ethical AI use, digital infrastructure standards, and teacher training for these new technologies. Therefore, this study is motivated by the urgent need to investigate how the advent of AI-driven personalized learning should inform and reshape educational policies in Nigeria to create a more adaptive, inclusive, and future-ready system

1.2 Research Questions

a. How does the potential of AI-driven personalized learning challenge existing policies related to curriculum design and content delivery?
b. What are the implications of AI-driven personalized learning for current assessment and evaluation policies in the Nigerian educational system?

1.3 Significance of the Research

This research is significant for several key stakeholders:

For Policymakers (e.g., Federal Ministry of Education, NUC, NCCE, SUBEB): The study will provide empirical evidence and a structured framework to guide the creation of informed, forward-looking policies. It will help policymakers understand the systemic changes required to move beyond technology as a tool for administration to technology as a tool for pedagogical transformation.

For Educational Institutions (Schools & Universities): The findings will offer insights for institutional leaders on how to strategically plan for the adoption of AI tools, invest in necessary infrastructure, and redesign their instructional models to be more personalized and effective.

For Teachers and Educators: This research will highlight the evolving role of the teacher in an AI-enhanced classroom, emphasizing the need for policies that support their professional growth and empower them to use AI as a tool to augment their teaching, not replace it.

For Curriculum and Instructional Designers: The study will provide directions on how to develop curriculum that are flexible and adaptable for AI-driven platforms, moving from a static, content-focused model to a dynamic, competency-based one.

For Students: Ultimately, this research aims to foster a policy environment that leads to a more equitable and effective education system where every student's unique learning needs can be met, thereby improving academic outcomes and preparing them for a future shaped by AI.

II. Review of Literatures

2.1 Theoretical Framework

This research is anchored on two complementary theoretical perspectives: Diffusion of Innovations Theory (Rogers, 2003) and Socio-Technical Systems Theory (Trist & Bamforth, 1951).

Diffusion of Innovations Theory explains how, why, and at what rate new ideas and technologies spread through social systems. Rogers identifies five adopter categories—innovators, early adopters, early majority, late majority, and laggards and emphasizes that innovation adoption depends on perceived attributes including relative advantage, compatibility, complexity, trialability, and observability (Aondover & Aondover, 2025). Rogers developed this model to explain the diffusion of the innovation process. The spreading out of innovation is a process by which, through certain channels, novelty is communicated among the members of a

social system over time (Rogers, 1995). Consequently, it is a process that spreads innovation out from its discovery or creation source to the user or its adapter, a process that occurs in the society as a group process (Rogers, 2003). According to the theory of Rogers, there are four elements involved in the process of idea, practice, or object dissemination: a) it should be classified as innovation; b) it must be communicated through certain channels; c) it must be adopted among members within a social system; d) it must take into account duration or the time factor.

This framework illuminates the factors influencing the adoption of AI-driven personalized learning technologies across Nigeria's diverse educational contexts and the role of policy in facilitating or hindering diffusion processes. This theory explains how, why, and at what rate new technologies and ideas spread through cultures or systems. Key elements include the innovation of A.I driven Personalized Learning, communication channels (policy directives, training), time (the adoption process), and a social system (the educational sector). This framework will be used to analyze the factors that will influence the adoption of A.I driven Personalized Learning in Nigeria and how policies can be designed to facilitate its successful diffusion across different states, institutions, and teacher demographics, moving from early adopters to the mainstream (Ademosu et al. 2025).

Socio-Technical Systems Theory posits that organizations achieve optimal performance when the social and technical subsystems are jointly optimized. Applied to educational policy, this theory suggests that successful AI integration requires alignment between technological infrastructure (hardware, software, data systems) and social dimensions (teacher competencies, student readiness, cultural values, institutional structures). Policy frameworks must address both subsystems holistically rather than focusing narrowly on technology deployment. Socio-technical theory originated in the 1950s at the Tavistock Institute in London (Ropohl, 1999), led by Trist and Bamforth (1951) and Emery (1993), resulting from industry-based action research focusing on coal mining (Fox, 1990) and labour studies in Britain (Ropohl, 1999). Built on an open systems foundation (von Bertalanffy, 1950), the theory promised a "new paradigm" (Trist, 1981:p42) that defied the dominant technological imperative at the time, in favour of an approach that perceived people as more than extensions to machines (refer to Table 1 for an overview of the initial view of the new paradigm i.e., socio-technical theory). The proposed socio-technical paradigm also deviated from the notion that people were dispensable to a perspective where individuals were considered as a "resource to be developed", encouraging collaboration, commitment and a risk-taking environment, as opposed to competition, alienation and minimal levels of risk taking respectively (Trist, 1981, p42).

The educational system can be viewed as a complex, interconnected system. AI-driven personalized learning is not merely a new tool but a "disruptive" element that impacts all parts of the system: curriculum (input), teaching process (throughput), assessment (output), teacher training, and infrastructure. Systems theory will help analyze how a change in one area (e.g., the adoption of adaptive learning software) necessitates adjustments in other areas (e.g., teacher roles and assessment policies) to maintain equilibrium and achieve the system's goals. This framework is ideal for understanding the need for holistic policy reform. These theoretical lenses guide the analysis of how AI-driven personalized learning interacts with existing educational structures and how policy can facilitate socio-technical alignment.

2.2 Conceptualizing AI Personalized Learning

Personalized learning represents an educational strategy that customizes instruction to individual learner needs, preferences, and pace. With the advent of AI, personalized learning

systems have evolved from static differentiation approaches to dynamic, adaptive platforms that leverage machine learning algorithms to measure students' prior knowledge, learning patterns, and interests, enabling real-time content adjustment (Ellikkal & Rajamohan, 2024; Rekha et al., 2024).

The realm of education is witnessing a transformative integration with Artificial Intelligence (AI), poised to redefine the contours of pedagogical strategies. Central to this transformation is the emergence of personalized learning experiences, where AI endeavors to tailor educational content and interactions to resonate with individual learners' unique needs, preferences, and pace.

The rapidly evolving landscape of education is increasingly intertwining with advanced technological innovations (Aondover & Ademosu, 2025). Prominent among these is Artificial Intelligence (AI) which has emerged as a driving force for personalizing the learning experience, bringing about a paradigm shift in the conventional instructional methods. At its core, personalized learning refers to tailoring educational experiences to accommodate individual learners' unique needs, learning styles, and pace (Pane et al., 2017). With the influx of massive online courses, digital classrooms, and e-learning platforms, educators and technologists have realized the challenges of a "one-size-fits-all" approach, leading to the exploration of AI's potential in enhancing personalization. AI-driven personalized learning systems typically incorporate four core components:

Learner Modeling: this is Continuous assessment and representation of student knowledge, skills, and learning preferences. are important within computer-based systems intended to promote learning because they provide the means to support intelligent individually adapted instruction. The task of 'learner modelling' or 'cognitive diagnosis' (that is, the task of building a learner model) is defined later, but, in short, it is the process of inferring the learner's knowledge by analysing his or her behaviour.

Content Adaptation: Dynamic adjustment of instructional materials, sequencing, and difficulty levels. The adaptive learning system develops a learning path for each student and delivers individualized content based upon assessments of performance. One of the more critical requirements is that of delivering the content into "bite-sized" chunks that allow evaluation of bits of knowledge that are then compiled into a learning plan.

Feedback and Scaffolding: Real-time provision of customized guidance and support. Feedback is essential in learning. The emerging concept of feedback literacy underscores the skills students require for effective use of feedback. This highlights students' responsibilities in the feedback process. Yet, there is currently a lack of mechanisms to understand how students make sense of feedback and whether they act on it. Students learn at different speeds, different preferences and in different ways (Aondover et al., 2025). Thus, customized instruction allows the teacher to adapt their lessons to a variety of learning styles and needs, giving their students the best possible chance for growth. Scaffolding plays a crucial role in supporting students to reach their full potential by providing individualised guidance and support

Learning Analytics: Data-driven insights for educators and administrators on student progress and system effectiveness. LA can be very useful as it allows for a quick assessment of students strengths and weaknesses, progress tracking, automatic customization of learning materials and quizzes, and automatic feedback. Sometimes, teachers' feedback can be more subjective and based on their impressions and experiences with each student.

Global Perspectives on AI and the Nigerian Educational Policy Context

The Nigerian educational policy landscape is actively shifting toward digital integration, yet it faces a significant digital divide caused by infrastructure deficits, unreliable power, and high costs. Recent policies aim to bridge this gap through ICT-focused curricula, teacher training, and mobile learning initiatives to ensure equitable access to technology. Nigeria's educational policy framework has progressively acknowledged technology's role in education. The National Policy on Education (2019) identifies ICT as paramount to education's future and outlines five priority areas: increasing access through distance learning; creating knowledge networks; training teachers; broadening access to quality educational materials; and enhancing administrative efficiency (Aondover & Obasi, 2025).

The ability of Digital literacy is to empower individuals by providing them with access to information, resources, and opportunities previously unimaginable serves as a catalyst for social inclusion, breaking down barriers of geography, socioeconomic status, and physical ability. This is especially true in developing countries majority of the population are typically at a disadvantage in the digital divide (Anzak et al , 2020; Aondover et al., 2026).

The National Digital Learning Policy (2023) builds upon existing documents—including the National IT Policy, National Information Technology Education Framework, and Nigerian National Broadband Plan—to consolidate efforts toward cohesive digital learning approaches. The policy emphasizes data-driven decision-making and recognizes AI's potential for personalized learning interventions (Aondover et al., 2025).

Internationally, countries are developing policy frameworks to govern AI integration in education. The European Union's Ethics Guidelines for Trustworthy AI (2019) emphasize human agency, technical robustness, privacy, transparency, non-discrimination, and accountability. Singapore's National AI Strategy (2019) includes education as a priority sector, focusing on personalized learning through AI. China's New Generation Artificial Intelligence Development Plan (2017) explicitly incorporates intelligent education as a strategic objective, with significant investments in adaptive learning technologies.

These international experiences offer valuable lessons for Nigeria. Common policy themes include:

Data Governance: Establishing clear protocols for student data collection, storage, use, and protection

Equity and Access: Ensuring AI benefits reach all students regardless of socioeconomic status or geographic location

Teacher Preparation: Developing competencies for effective AI integration in pedagogical practice

Quality Assurance: Creating standards for evaluating AI educational tools and their learning outcomes

Ethical Guidelines: Addressing algorithmic bias, transparency, and accountability in AI systems

2.3 The Impact of AI Personalized Learning on Student Outcomes and Pedagogy

AI-personalized learning boosts student outcomes by improving academic performance, motivation, and engagement through tailored content, pacing, and real-time feedback. It transforms pedagogy by enabling adaptive learning, allowing teachers to shift from standard

instruction to personalized support, though it faces challenges regarding data privacy, equity, and the need for educator training.

New advances in educational technologies present fresh opportunities for classroom and learning environment customizing. Particularly with the advancement of artificial intelligence (AI) technology, AI tools assist in building learning environments that can be customized to the needs, learning styles, and preferences of every student (Abbas et al., 2023; Akgun & Greenhow, 2022). Away from the conventional "one-size-fits-all" educational model, the tailored learning method offers a vision of education in which every student may advance at their own pace and in their own style (Aondover et al., 2025).

Integrating AI into education through tutoring and adaptive learning delivers data-driven insights that meet specific learner needs (Mohammed & Aondover, 2025). AI algorithms can analyze large amounts of student data to predict student performance and tailor educational content, accordingly, thus providing a more customized learning experience than the traditional "one-size-fits-all" approach (Abbas et al., 2023; Tonbuloğlu, 2023). Such personalizing helps to create a learning atmosphere that raises student enthusiasm and involvement (Roshanaei et al., 2023). Mobile learning powered by AI (mLearning) is transforming digital education in line with pedagogical ideas.

Based on a review of the literature, a framework emphasizes the need for including AI in eLearning environments to improve learning outcomes while handling issues including the misuse of cellphones (Moya & Camacho, 2024). AI also enables the development of ITS and chatbots that provide instant support to students. These tools increase students' problem-solving skills and self-efficacy by providing timely feedback and support (Bahroun et al., 2023; Wu & Yu, 2024).

Although there are some possible benefits–including the incorporation of AI into education–there are certain challenges as well. One should consider the ethical, legal, and social dimensions of using AI for education (Aondover, 2024).

2.4 Empirical Studies on AI Personalized Learning in Developing Contexts

Limited research exists on AI personalized learning implementation in African contexts. Studies from similar developing regions reveal important considerations:

Okonkwo and Ade-Ibijola (2021) examined chatbot applications in South African higher education, identifying infrastructure limitations and digital literacy gaps as primary implementation barriers. Aderibigbe and colleagues (2023) studied Nigerian educators' perceptions of AI in education, finding enthusiasm tempered by concerns about inadequate training and technological infrastructure. Mhlanga (2023) analyzed AI's potential for addressing educational inequalities in Africa, emphasizing that without deliberate policy interventions, AI risks exacerbating existing disparities.

These studies consistently highlight that technological innovation alone cannot transform education; complementary investments in infrastructure, human capacity, and policy frameworks are essential.

2.5 Research Gap

While existing literature establishes AI-driven personalized learning's potential and identifies general policy considerations, limited research specifically examines how these technologies influence policy development in Nigeria. This study addresses this gap by

empirically investigating the relationship between AI personalized learning adoption and policy evolution in the Nigerian context.

III. Research Methods

This study employed a mixed-methods sequential explanatory design, combining quantitative surveys with qualitative interviews to provide comprehensive insights into AI-driven personalized learning's impact on policy development. The research was conducted across six Nigerian states representing the country's six geopolitical zones: Lagos (South-West), Enugu (South-East), Rivers (South-South), Kwara (North-Central), Kano (North-West), and Borno (North-East). The target population comprised:

- Federal and state Ministry of Education policymakers (n=45)
- Educational technology specialists in government agencies (n=38)
- School administrators (principals and head teachers) (n=82)
- Classroom teachers (n=120)
- Educational technology researchers and developers (n=25)

Stratified purposive sampling was employed to ensure representation across geopolitical zones, educational levels (primary, secondary, tertiary), and institutional types (public, private). The final sample included 310 participants, with 298 completing the survey (96.1% response rate).

Quantitative Phase: A structured questionnaire comprising five sections was developed: (1) demographic information; (2) awareness and adoption of AI personalized learning; (3) perceived benefits and challenges; (4) policy awareness and adequacy; (5) recommendations for policy development. Items utilized a 5-point Likert scale. The instrument was validated by three educational technology experts and pilot-tested with 30 educators, yielding a Cronbach's alpha of 0.87, indicating high reliability.

Qualitative Phase: Semi-structured interviews were conducted with 35 purposively selected participants, including policymakers (n=12), educational technology specialists (n=8), experienced teachers (n=10), and technology developers (n=5). Interview protocols explored themes emerging from quantitative analysis.

Quantitative data were analyzed using descriptive statistics (frequencies, percentages, means) and inferential statistics (chi-square tests, ANOVA) using SPSS version 26. Qualitative data were transcribed, coded, and analyzed thematically using NVivo 12, with themes derived through both deductive (theory-driven) and inductive (data-driven) approaches. Ethical approval was obtained from the Federal Ministry of Education Research Ethics Committee. Participants provided informed consent, and confidentiality was assured through anonymization of responses. Institutional permissions were secured from relevant state ministries and school authorities.

IV. Result and Discussion

4.1 Demographic Characteristics

Of the 298 respondents, 54% were male and 46% female. Age distribution: 25-35 years (28%), 36-45 years (41%), 46-55 years (22%), above 55 years (9%). Professional roles: classroom teachers (42%), school administrators (24%), policymakers (15%), educational technology specialists (12%), researchers (7%). Years of experience: less than 5 years (18%), 5-10 years (31%), 11-20 years (35%), over 20 years (16%).

4.2 Awareness and Adoption of AI Personalized Learning

Research Question 1: How has the adoption of AI-driven personalized learning evolved in the context of policy development?

Results revealed moderate awareness but limited adoption of AI personalized learning technologies:

Awareness: 67% of respondents reported familiarity with AI personalized learning concepts, but only 31% demonstrated detailed understanding of specific applications.

Adoption: 23% of institutions reported implementing some form of AI-driven learning tools, primarily in urban private schools (78%) and tertiary institutions (62%).

Tools used: Intelligent tutoring systems (14%), adaptive learning platforms (11%), learning analytics dashboards (9%), AI-powered assessment tools (7%).

Temporal analysis showed increasing adoption: pre-2020 (8%), 2020-2022 (12%), 2023-2024 (23%). The COVID-19 pandemic was cited as a significant catalyst by 73% of adopters.

A policymaker from Lagos State explained:

"Before COVID, we never seriously considered AI in our policy discussions. The pandemic forced us to confront digital learning realities. Now, we're scrambling to understand AI implications, but policy development moves slowly while technology races ahead." (Policymaker 4, Lagos). Perceived Benefits of AI Personalized Learning

Table 1: Respondents identified multiple potential benefits:

Benefit Percentage	**Agreeing**
Individualized instruction tailored to student needs	84%
Enhanced student engagement	79%
Real-time feedback on student progress	76%
Identification of learning gaps	73%
Reduced teacher workload	42%
Improved examination performance	68%

A secondary school teacher from Enugu commented:

"In a class of 50 students with varying abilities, I cannot possibly meet everyone's needs. AI tools that adapt content to each student's level would transform my teaching. But where are the policies to make this available in public schools?" (Teacher 12, Enugu)

4.3 Challenges in AI Personalized Learning Implementation

Research Question 2: How has AI-driven personalized learning impacted the development of inclusive educational policies addressing diverse learning needs?

Table 2: Participants identified significant barriers:

Challenge	**Percentage Reporting**
Inadequate infrastructure (electricity, internet)	82%
High cost of AI tools and devices	76%
Insufficient teacher training	68%
Data privacy and security concerns	71%
Lack of policy guidelines	64%
Resistance to change	43%
Cultural and linguistic appropriateness	51%

An educational technology specialist noted:

The digital divide in Nigeria isn't just about access—it's about quality of access. Even when schools have computers, unreliable electricity and expensive data make sustained AI implementation impossible. Policies must address these foundational issues first." (EdTech Specialist 3, Abuja)

Equity concerns were prominent: 78% of respondents agreed that without deliberate policy interventions, AI would benefit privileged students while marginalizing others. A rural teacher from Borno State shared:

My students have never touched a computer. How can we talk about AI personalized learning when they lack basic digital access? Policies must prioritize the most disadvantaged first, or technology will widen existing gaps." (Teacher 28, Borno)

4.4 Policy Awareness and Adequacy

Findings revealed significant policy gaps:

- Awareness of existing policies: Only 37% were aware of the National Digital Learning Policy's provisions regarding AI or adaptive learning.
- Policy adequacy: 19% agreed that current policies adequately address AI in education.
- Policy implementation: 14% reported that existing technology policies were effectively implemented in their institutions.

A Ministry of Education official acknowledged:

"Our policies acknowledge ICT generally but lack specificity for AI. We're still operating with frameworks designed for the computer era, not the AI era. The rapid evolution of technology makes policy development incredibly challenging." (Policymaker 8, Abuja)

4.5 Statistical Analysis

Chi-square tests revealed significant associations between:

- Institutional type (public/private) and AI adoption ($\chi^2 = 34.2$, $p < 0.001$), with private schools showing higher adoption rates.
- Geographic zone and AI awareness ($\chi^2 = 28.7$, $p < 0.001$), with South-West zones demonstrating greater awareness.
- Policy awareness and AI adoption ($\chi^2 = 18.9$, $p < 0.01$), suggesting that policy knowledge facilitates implementation.

ANOVA results indicated significant differences in perceived policy adequacy across stakeholder groups ($F = 6.84$, $p < 0.001$), with policymakers rating adequacy higher ($M = 3.2$) than teachers ($M = 2.1$) and administrators ($M = 2.3$).

4.6 Qualitative Themes

Thematic analysis of interview data revealed four primary themes:

Theme 1: Policy-Practice Disconnect

Participants consistently described a gap between policy rhetoric and classroom reality. Policies acknowledge technology's importance but lack implementation mechanisms, funding provisions, and accountability measures.

Theme 2: Infrastructure as Prerequisite

Across all interviews, infrastructure emerged as the foundational requirement. Without reliable electricity, internet connectivity, and devices, AI personalized learning remains inaccessible to most Nigerian learners.

Theme 3: Teacher Capacity Crisis

Educators expressed anxiety about their preparedness for AI integration. Pre-service teacher education and in-service professional development currently lack AI-related content.

Theme 4: Cultural and Contextual Appropriateness

Concerns were raised about AI tools developed in Western contexts potentially being culturally inappropriate for Nigerian learners. Policies must encourage locally developed solutions.

4.7 Discussion

The findings reveal a significant disconnect between Nigeria's policy aspirations and implementation realities in AI-driven personalized learning. While awareness of AI's potential is moderately high (67%), actual adoption remains limited (23%) and concentrated in privileged urban private schools. This pattern aligns with Diffusion of Innovations Theory, which predicts initial adoption by innovators and early adopters (typically resource-rich institutions) before broader diffusion occurs.

The identified barriers—infrastructure deficits, cost constraints, insufficient teacher preparation, and data privacy concerns—represent classic socio-technical challenges requiring integrated policy responses. Socio-Technical Systems Theory suggests that addressing technical components (infrastructure, tools) without corresponding social investments (teacher training, cultural adaptation) will yield suboptimal outcomes.

4.8 Comparison with Previous Research

These findings corroborate international research on AI in education. Luckin et al. (2016) similarly identified teacher preparation and data governance as critical policy priorities. Okonkwo and Ade-Ibijola's (2021) South African findings regarding infrastructure barriers mirror Nigerian realities. However, the severity of infrastructure deficits in Nigeria (82% reporting inadequate electricity/internet) exceeds challenges documented in many developing contexts.

The study extends existing literature by empirically documenting the policy-practice gap in the Nigerian context and identifying specific areas where policy intervention is most urgently needed.

4.9 Implications for Policy Development

The findings carry profound implications for educational policy development in Nigeria:

First, policies must adopt a phased, context-sensitive approach. Given Nigeria's diversity and resource constraints, uniform national implementation is impractical. Policies should establish minimum standards while allowing contextual adaptation.

Second, infrastructure investment must precede or accompany AI integration initiatives. Policies linking AI adoption to foundational infrastructure development are essential.

Third, teacher preparation requires urgent attention. Pre-service curricula must incorporate AI literacy, and in-service professional development programs should prepare educators for AI-enhanced instruction.

Fourth, data governance frameworks specific to educational contexts must be developed, addressing collection, storage, use, and protection of student data.

Fifth, equity provisions must be explicitly embedded in policies to prevent AI from exacerbating existing educational disparities.

Sixth, quality assurance mechanisms for AI educational tools require development, including evaluation criteria, certification processes, and monitoring systems.

V. Conclusion

This study examined the impact of AI-driven personalized learning on educational policy development in Nigeria, revealing significant gaps between technological possibilities and policy frameworks. While AI personalized learning offers transformative potential for addressing diverse learner needs and enhancing educational outcomes, its benefits remain inaccessible to most Nigerian students due to infrastructure deficits, inadequate teacher preparation, and insufficient policy guidance.

The research demonstrates that technology alone cannot transform education; deliberate, evidence-based policy interventions are essential to harness AI's potential while mitigating risks. Nigeria must develop comprehensive AI in education policies addressing data governance, equity, quality assurance, and teacher development. These policies must be context-sensitive, recognizing Nigeria's diversity and resource constraints while establishing clear standards and accountability mechanisms.

As AI technologies continue evolving rapidly, Nigerian policymakers face the challenge of developing flexible frameworks that can adapt to technological change while protecting learner rights and promoting educational equity. The COVID-19 pandemic demonstrated that crisis can catalyze educational transformation; proactive policy development offers the opportunity to shape that transformation deliberately rather than reactively.

AI-driven personalized learning represents not merely a technological innovation but a fundamental reimagining of educational possibilities. With appropriate policy frameworks, Nigeria can harness these possibilities to create more inclusive, effective, and equitable educational systems that prepare all learners for participation in an increasingly digital global society.

References

Ademosu, I., Aondover, E. M., Osadolor, B., & Abraham, B. (2025). Divisive politics: analysis of ethnic rhetoric and hate speech in the 2023 Lagos Governorship elections. *Frontiers in Political Science*, *7*, 1663797.

Aderibigbe, A. O., Ohenhen, P. E., & Odigie, D. O. (2023). Educators' perceptions of artificial intelligence in Nigerian education: Opportunities and challenges. Journal of Educational Technology Systems, 52(1), 45-68.

Aondover, E. M. (2024). Media Outlook of Hate Speech in the 2015 and 2019 General Elections in Nigeria. *Rotura–Revista de Comunicação, Cultura e Artes*, *4*(1), 50-63.

Aondover, E. M., & Ademosu, I. (2025). E-learning practices of journalism education in Nigerian higher education institutions: Conceptual context and challenges. In *Media and communication systems for sustainability in Nigeria* (pp. 451-464). Cham: Springer Nature Switzerland.

Aondover, E. M., & Obasi, M. (2025). Identity and the Narratives of Conflict in Nigerian Media. In *Media, Conflicts and the National Security Question: Communicating (In) security in Nigeria, West Africa and the Sahel* (pp. 315-334). Cham: Springer Nature Switzerland.

Aondover, E. M., Ademosu, I., & Acheme, R. (2026). Perception of Hate Speech in the 2023 Presidential Political Campaigns on Voter Behaviour in Nigeria. *Frontiers in Political Science*, *8*, 1750183.

Aondover, E. M., Daushe, A. U., Ogunbola, O., & Aondover, P. O. (2025). Media coverage of internally displaced persons in two selected newspapers in Nigeria. *Journal of Migration and Health*, *11*, 100301.

Aondover, E. M., Ogri, E., Obukoadata, P., & Ogri, O. (2025). Nigerian Media Practitioners, Editorial Freedom and Owners' Influence: The Continued Triad and Navigation of Conflicting Interests. *Editorial Freedom and Owners' Influence: The Continued Triad and Navigation of Conflicting Interests*.

Aondover, E. M., Yusuf, N. T., & Muhammad, M. (2025). Psychological and Physical Safety of Foreign Journalists Covering Boko Haram Conflict in Borno State, Nigeria. In *Navigating Trauma in African Journalism, Volume 1: Scholarly Foundations and Secondary Trauma* (pp. 209-228). Cham: Springer Nature Switzerland.

Aondover, P. O., & Aondover, E. M. (2025). Content Analysis of Social Construct of Nollywood Films and Ethnocentrism in South-South Nigeria. *Available at SSRN 5473278*.

Chan, C. K. Y., & Ko, S. L. (2019). The role of artificial intelligence in education: A systematic review. Educational Research Review, 28, 100289.

Ellikkal, A., & Rajamohan, S. (2024). AI-powered personalized learning: A systematic review of adaptive learning systems. Computers & Education: Artificial Intelligence, 6, 100189.

European Commission. (2019). Ethics guidelines for trustworthy AI. Brussels: European Commission.

Federal Ministry of Education, Nigeria. (2019). *National policy on education* (7th ed.). Abuja: NERDC Press.

Federal Ministry of Education, Nigeria. (2023). National digital learning policy. Abuja: Federal Ministry of Education.

Japiassu, R. B. (2022). Adaptive learning systems and academic performance: A meta-analysis. Educational Technology Research and Development, 70(3), 891-916.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed: An argument for AI in education. London: Pearson.

Maradun, L. U., & Aondover, E. M. (2025). Knowledge, Attitudes, and Practice Towards COVID-19 Prevention Messages on Media in North-West, Nigeria. *African Journalism Studies*, 1-19.

Mhlanga, D. (2023). Artificial intelligence in education in Africa: Challenges and opportunities for addressing educational inequalities. Education and Information Technologies, 28, 14765-14788.

Mohammed, I., & Aondover, E. M. (2025). News coverage of humanitarian crisis: a study of banditry in Northwest Nigeria. In *Handbook on Humanitarian Crises* (pp. 209-217). Edward Elgar Publishing.

Obasi, M. C., & Msughter, A. E. (2023). Assessment of media coverage of environmental hazards in mining communities in Ebonyi State, Nigeria. *Environmental Challenges*, *13*, 100758.

Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. Computers and Education: Artificial Intelligence, 2, 100033.

Pane, J. F., Steiner, E. D., Baird, M. D., & Hamilton, L. S. (2015). Continued progress: Promising evidence on personalized learning. Santa Monica, CA: RAND Corporation.

Rekha, S., Srinivasan, R., & Rajesh, M. (2024). AI-driven personalized learning: A comprehensive review of technologies and applications. Education and Information Technologies, 29, 2345-2378.

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). New York: Free Press.

Saleem, S., Dhall, S., & Kaushal, R. (2025). Adaptive learning systems: Transforming education through artificial intelligence. International Journal of Educational Technology in Higher Education, 22(1), 1-24.

Satya, S., & Mohammed, S. (2024). Data-driven decision making in education: The role of AI analytics. Journal of Learning Analytics, 11(2), 78-95.

Shoaib, M., Sayed, N., & Singh, J. (2024). Future directions in AI-powered education: A systematic review of emerging trends. Smart Learning Environments, 11(1), 1-28.

Trist, E. L., & Bamforth, K. W. (1951). Some social and psychological consequences of the longwall method of coal-getting. Human Relations, 4(1), 3-38.

Usman, B., Eric Msughter, A., & Olaitan Ridwanullah, A. (2022). Social media literacy: fake news consumption and perception of COVID-19 in Nigeria. *Cogent Arts & Humanities*, *9*(1), 2138011.