

SUSTAINABLE DIGITAL INCLUSION THROUGH AI-BASED LEARNING SYSTEMS IN EDUCATION: A SOUTHEAST NIGERIA PERSPECTIVE

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ABSTRACT

This study examines the potential and challenges of implementing AI-driven learning platform systems in Nigeria's education sector to promote sustainable digital inclusion. Despite Nigeria's rapidly growing population and the urgent need for scalable educational solutions, the sector continues to grapple with significant disparities in access, quality, and infrastructure. Artificial intelligence (AI) offers promising avenues for personalized learning, automated assessments, and expanding educational reach to underserved communities, thereby aligning with Nigeria's national development goals and global sustainable development targets. This research explores the landscape of AI adoption in Nigerian education, highlighting successful pilot initiatives, infrastructural limitations, policy gaps, and socio-cultural considerations that influence implementation. Through a correlational approach, including surveys, the study assesses the effectiveness of AI-based platforms in improving learning outcomes and promoting inclusivity. The study adopted a correlational design. The population was 634 lecturers from six colleges and faculties of education in the studied universities. The sample size was 317 lecturers which represented 50% of the population. This consisted of 80 lecturers' from Michael Okpara University of Agriculture, Umudike (MOUAAU), 75 lecturers from University of Nigeria, Nsukka (UNN), 53 lecturers' from Alex Ekwueme Federal University Ndufu Alike Ikwo (AE-FUNAI), 28 lecturers from Abia State University, Uturu (ABSU), 48 lecturers from Imo State University, Owerri (IMSU) and 33 lecturers from Ebonyi State University Abakaliki (EBSU). The sample was arrived at using four-staged sampling technique. Data for the study was collected using researchers' self-developed questionnaires. The instruments were validated by two experts from the Department of Educational Management and one expert from the Department of Science Education specialized in Measurement and Evaluation, all from MOUAAU. The reliability of the instruments was determined using Cronbach Alpha Method which yielded an alpha of .70 and .80 respectively which were considered reliable. Data were analyzed using Pearson Product Moment Correlation Coefficient (PPMCC) to answer the research questions while linear regression analysis was used to test the null hypotheses at .05 level of significance. It identifies critical barriers such as inadequate internet connectivity, limited technical capacity, data privacy concerns, and linguistic diversity, which impede widespread adoption. The study also underscores opportunities for sustainable integration of AI through targeted policy formulation, capacity building, infrastructural investments, and public-private partnerships. The findings aim to inform policymakers, educators, and technology developers on strategies to leverage AI for equitable access to quality education, fostering lifelong learning and socio-economic development. Ultimately, this research contributes to bridging the digital divide in Nigeria's education system and advancing the nation's vision of inclusive and sustainable development.

Keywords: Artificial Intelligence, Learning, System, Education and Sustainable Digital Inclusion

Introduction

Artificial Intelligence (AI) has emerged as a transformative force across various sectors, notably in education. AI-driven learning platform systems utilize advanced algorithms, machine learning, and data analytics to customize learning experiences, automate administrative tasks, and enhance pedagogical outcomes (Luckin et al., 2016). These systems are designed to simulate intelligent behavior—adapting content, providing real-time feedback, and personalizing instructional methods to meet individual learners' needs (Chen, 2019). Globally, AI integration in education has gained momentum, promising to revolutionize traditional teaching models into learner-centered, flexible, and scalable systems (Holmes, Bialik, & Fadel, 2019). In Nigeria, the education sector faces numerous challenges, including inadequate infrastructure, paucity of qualified teachers, large class sizes, and limited access to quality educational resources (Akpotu, 2015). Despite efforts by the government and various stakeholders to improve literacy and educational outcomes, disparities persist across regions, especially between urban and rural areas. According to the National Bureau of Statistics (NBS, 2020), Nigeria's literacy rate remains below global standards, with significant gaps in access and quality of education. These systemic issues underscore the urgent need for innovative solutions that can bridge educational inequities and enhance the quality of learning.

Rationale for AI-Driven Learning Systems in Nigeria

The integration of AI-driven learning platforms presents a promising solution to Nigeria's educational challenges. These systems can foster personalized learning, accommodate diverse learning paces, and provide constant assessment and feedback—features that traditional classrooms struggle to deliver at scale (Nzomiwa, 2020). Moreover, AI can serve as an equalizer by expanding access to quality resources, especially in remote or underserved areas where experienced teachers are scarce. For example, AI-powered mobile learning apps enable learners to access curricula through smartphones—a device increasingly prevalent even in low-income communities (Olumide & Oyekanmi, 2020).

Furthermore, AI can assist educators by automating administrative duties such as grading, attendance tracking, and record-keeping, thus allowing teachers to concentrate on pedagogical engagement. The deployment of AI in Nigeria's educational ecosystem aligns with the country's vision for digital transformation and aligns with the broader digital economy growth strategy outlined in the National Digital Economy Policy and Strategy (NDEPS, 2019). Implementing such technologies can contribute to sustainable development by improving literacy rates, fostering innovation, and equipping youth with relevant skills for the 21st-century workforce.

Existing Initiatives and Adoption of AI in Nigerian Education

While AI adoption in Nigerian education remains in its nascent stages, some pilot projects and initiatives have demonstrated potential. For instance, the use of AI-based tutoring systems in select universities and e-learning platforms has shown promise in enhancing student engagement and outcomes (Adeleke & Oladele, 2021). The Nigeria University Kit (NUK), an AI-powered digital library system, aims to provide students with free access to learning materials and research tools. Additionally, private EdTech companies such as Andela and PrepClass have incorporated AI components to personalize learning experiences and improve student retention.

However, widespread AI integration faces significant hurdles. These include limited technological infrastructure, inadequate policy frameworks, lack of skilled personnel, and concerns over data privacy. The country's infrastructural deficits—namely inconsistent

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electricity and poor internet connectivity—pose major barriers to deploying AI solutions at scale (Eze et al., 2020). Moreover, there is a shortage of local expertise in AI research and development, which constrains the country's capacity to innovate and maintain such systems independently.

AI for Nigeria's Sustainable Development

The United Nations Sustainable Development Goals (SDGs) emphasize quality education (Goal 4) as a crucial pathway to societal prosperity. For Nigeria, leveraging AI-driven learning platforms offers an opportunity to address disparities and foster inclusive education (UNDP, 2019). By enabling scalable, adaptive, and quality-assured learning experiences, AI can contribute substantially to reducing illiteracy, promoting lifelong learning, and nurturing a generation capable of driving technological progress.

More broadly, AI in education can stimulate economic development by cultivating digitally literate youth who are prepared for future jobs requiring advanced skills (World Bank, 2020). It can also promote social cohesion by providing equitable access to education irrespective of geographical or socio-economic barriers. Therefore, exploring AI-driven learning system integration in Nigeria isn't merely a technological pursuit but a strategic imperative for national development.

Notwithstanding its potential, deploying AI-based education systems in Nigeria requires careful consideration of various challenges. These include ethical concerns over data privacy and security, bias in algorithms that may reinforce existing inequalities, and the risk of digital divide exacerbation if access barriers are not addressed (OECD, 2021). Additionally, there is a need to develop national policies that regulate and guide AI applications to ensure ethical, equitable, and inclusive implementation.

Another critical consideration is capacity building. Nigerian educators and policymakers need training to understand and manage AI tools effectively. Furthermore, fostering local AI research and innovation ecosystems is essential to ensure that solutions are contextually relevant and sustainable. External support from international partnerships and investments can accelerate these efforts, but they must be aligned with national priorities and cultural contexts.

Regardless of Nigeria's significant population and its potential for economic growth, the country continues to face substantial challenges in providing equitable and quality education to all its citizens. The disparities in access to educational resources, qualified teachers, and infrastructure—especially between urban and rural areas—highlight critical gaps that hinder Nigeria's progress toward sustainable development goals (NBS, 2020). Traditional educational models often struggle to adapt to the diverse needs of learners, limiting opportunities for inclusive participation. In recent years, advancements in Artificial Intelligence (AI) have demonstrated the capacity to revolutionize education through personalized learning, automation, and data-driven decision-making (Luckin et al., 2016). AI-driven learning platform systems offer promising solutions to address Nigeria's educational shortcomings by enhancing access, improving learning outcomes, and promoting digital inclusion. These systems can facilitate tailored instruction, accommodate various learning paces, and extend educational reach to underserved populations, particularly in remote areas where qualified teachers are scarce (Ngugi et al., 2019). However, the adoption of AI technologies in Nigeria's education sector remains limited, primarily due to infrastructural deficits, inadequate

policy frameworks, lack of locally relevant AI solutions, and insufficient technical capacity among educators and administrators

Unizik Journal of Educational Management and Policy (UJOEMP), Vol 7, No. 1, September, 2025. ISSN: 2276-7630 (Eze et al., 2020). Furthermore, concerns about data privacy, ethical considerations, and cultural relevance pose additional barriers to widespread implementation. Thus, despite the potential for AI to promote sustainable digital inclusion and elevate the quality of Nigerian education, significant challenges hinder its effective deployment. The lack of a comprehensive understanding of how AI-driven learning systems can be contextually adapted and scaled in Nigeria raises critical questions about the feasibility, sustainability, and impact of integrating such technologies in the country's educational landscape.

Statement of the Problem

Despite the rapid advancement of digital technologies globally, Nigeria faces significant disparities in access to quality education, largely due to inadequate infrastructure, limited resources, and socio-economic barriers. The emergence of AI-driven learning platform systems promises to transform education by offering personalized, flexible, and scalable learning experiences, which are crucial for promoting inclusive education. However, the integration and effective deployment of these AI-based systems in Nigeria remain challenged by infrastructural deficiencies, digital illiteracy, and a lack of contextually relevant content. This hinders the country's efforts toward sustainable digital inclusion, risking the widening of educational inequalities. Therefore, there is an urgent need to investigate how AI-driven learning platforms can be optimized to support equitable access to quality education across Nigeria, ensuring that technological advancements benefit all learners regardless of their socio-economic background, thereby fostering sustainable educational development and inclusion.

Research Questions:

1. How do AI-driven learning platforms influence digital inclusion and educational access among learners in Nigeria?
2. What are the key barriers and facilitators affecting the adoption of AI-driven learning systems in Nigerian educational institutions?

Hypotheses:

H1: The use of AI-driven learning platforms significantly improves access to quality education for marginalized groups in Nigeria.

H2: Factors such as infrastructural readiness, digital literacy, and contextual relevance significantly influence the adoption of AI-driven learning systems in Nigeria.

Literature Review

Artificial Intelligence (AI) has become a transformative technology in education worldwide, offering innovative approaches to enhance teaching and learning processes (Luckin et al., 2016). AI-driven learning platforms utilize machine learning algorithms, natural language processing, and data analytics to provide personalized, adaptive, and scalable educational experiences (Chen et al.,

2020). For developing countries like Nigeria, integrating AI into education could significantly mitigate existing disparities, promote digital inclusion, and support sustainable

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development goals (United Nations, 2015). This review synthesizes existing research on AI-driven educational systems, highlighting opportunities, challenges, and implications for Nigeria's goal of achieving inclusive and equitable quality education.

Globally, AI has been increasingly incorporated into various educational settings, ranging from personalized tutoring systems to automatic grading and content recommendation platforms (Holmes, Bialik, & Fadel, 2019). AI's ability to adapt to individual learners' needs has been shown to improve engagement and learning outcomes (Walkington, 2013). In developed nations, AI integration often benefits from robust infrastructural support, policy frameworks, and technological expertise. For instance, systems like Carnegie Learner in the United States and Squirrel AI in China demonstrate promising results in personalized learning (Feng & Liu, 2020). However, the deployment of AI-based educational systems in low- and middle-income countries (LMICs) like Nigeria remains limited, primarily due to infrastructural constraints, policy gaps, and socio-economic challenges (Ahn & Lee, 2020). Nevertheless, pilot projects in several African countries indicate that AI can facilitate access to quality education, especially in remote or underserved regions by providing scalable, low-cost solutions (Ngugi et al., 2019).

AI and Digital Inclusion in Nigeria

Digital inclusion refers to equitable access to digital technologies and skills necessary for participation in the digital economy (World Bank, 2020). Nigeria's vast population, coupled with persistent infrastructural disparities, underscores the importance of AI-enabled solutions to bridge educational gaps (Eze et al., 2020). Several initiatives—such as mobile learning platforms, AI-based chatbots, and adaptive e-learning modules—are emerging to promote access to education in Nigeria's rural and underserved communities (Adeleke & Oladele, 2021).

Studies suggest that AI-powered platforms can facilitate multilingual instruction, accommodate diverse learning paces, and provide alternative assessment mechanisms, thus promoting inclusiveness (Nwankwo & Madubuko, 2019). Mobile AI applications, which utilize Nigeria's high mobile phone penetration, have shown promise in expanding access to educational content beyond traditional classrooms (Olumide & Oyekanmi, 2020). These solutions align with Nigeria's strategic vision for Digital Nigeria, aiming to leverage technology for socio-economic advancement and educational equity.

Challenges of AI Adoption for Digital Inclusion in Nigeria

Implementing AI-driven learning systems to promote digital inclusion in Nigeria faces multiple significant challenges. regardless of their potential, several barriers hinder widespread adoption of AI-driven learning systems in Nigeria. Infrastructure deficits such as inconsistent power supply and limited internet connectivity—remain critical impediments (Eze et al., 2020). Additionally, the scarcity of locally developed AI solutions tailored to Nigeria's linguistic and socio-cultural context limits relevance and acceptance (Nwachukwu, 2022).

First, infrastructural deficits are among the most pressing issues. Many schools, especially in rural and underserved areas, suffer from unreliable electricity, limited internet connectivity, and lack of suitable hardware, which are crucial for deploying sophisticated AI platforms (Eze et al., 2020). Without robust infrastructure, the scalability of AI solutions remains severely limited.

Second, there is a significant shortage of local expertise in AI and related fields. Many educators, policymakers, and technical staff lack the necessary skills to develop, manage, or effectively utilize AI technologies in educational contexts (Nwachukwu, 2022). This skills gap hampers capacity building and sustainable integration.

Third, policy and regulatory frameworks governing data privacy, security, and ethical AI use are insufficient or underdeveloped in Nigeria, raising concerns over data misuse, algorithmic bias, and citizen rights (OECD, 2021). These issues can undermine trust in AI systems and hinder adoption. Fourth, socio-cultural factors, including language barriers and varying levels of digital literacy, complicate efforts to implement AI solutions that are culturally relevant and accessible to Nigeria's diverse population (Nzomiwa, 2020).

Finally, financial constraints pose a barrier, as the high costs associated with AI research, infrastructure, and maintenance can be daunting for educational institutions and government agencies with limited budgets. Overcoming these challenges requires coordinated efforts, policy reforms, and investments to realize AI's potential for inclusive education.

Capacity constraints among educators and policymakers also pose significant challenges. Many teachers lack the skills to integrate AI tools into their pedagogy or to interpret data generated by such systems (Uche & Nnadozie, 2021). Furthermore, ethical considerations, including data privacy, security, and algorithmic bias, raise concerns about the equitable deployment of AI (OECD, 2021). Without robust regulatory frameworks and ethical guidelines, digital inclusion efforts may unintentionally deepen existing inequalities.

Opportunities for Sustainable Digital Inclusion

Despite these challenges, AI-driven learning platforms offer immense opportunities for fostering sustainable digital inclusion in Nigeria. Tailored AI solutions that incorporate local languages, culturally relevant content, and offline functionalities can extend educational access to marginalized populations (Nzomiwa, 2020). Partnerships with international development agencies and the private sector can facilitate infrastructural investments, capacity development, and policy formulation (World Bank, 2020):

AI-driven learning platforms present numerous opportunities to advance sustainable digital inclusion in Nigeria's education system. First, these technologies enable personalized learning experiences tailored to individual students' needs, learning paces, and linguistic backgrounds. This adaptability helps bridge disparities between urban and rural learners, facilitating equitable access to quality education (Nzomiwa, 2020). For instance, AI-powered mobile applications can deliver localized content in multiple languages, making education more accessible and culturally relevant.

Second, AI can significantly expand access to education in remote or underserved areas where qualified teachers are scarce. By providing scalable, low-cost solutions such as chatbots, interactive content, and offline-enabled platforms, AI can overcome infrastructural challenges and ensure continuous learning (Olumide & Oyekanmi, 2020). This approach aligns with Nigeria's national strategy to leverage digital technologies for inclusive development.

Third, AI-driven platforms can facilitate lifelong learning by offering skills training and vocational courses, helping marginalized populations improve employability and socio-economic status. This fosters a more inclusive society where diverse populations can participate meaningfully in Nigeria's digital economy (Uche & Nnadozie, 2021).

Finally, partnerships between government agencies, private sector stakeholders, and international organizations can foster innovations tailored to local needs, ensuring that digital inclusion efforts are sustainable and impactful in the long term. These opportunities ultimately contribute to Nigeria's broader vision of equitable, inclusive, and sustainable development.

Moreover, integrating AI into policy frameworks aligned with Nigeria's National Digital Economy Policy can create an enabling environment for innovative educational solutions (NDEPS, 2019). Building local expertise through research, innovation hubs, and vocational training can sustain AI ecosystem growth, ensuring that solutions are contextually appropriate and sustainable.

Future Directions and Research Gaps

Current literature underscores the need for empirical studies assessing the efficacy and scalability of AI-driven learning platforms specifically in the Nigerian context. Future research should examine the socio-cultural acceptability, cost-effectiveness, and long-term impacts of AI-enabled digital inclusion strategies. Additionally, exploring community engagement models can facilitate the development of inclusive solutions that address local needs and priorities (Ngugi et al., 2019). Therefore, AI-driven learning platform systems hold substantial promise for advancing sustainable digital inclusion in Nigeria's education sector. By offering personalized, accessible, and scalable learning experiences, AI can play a pivotal role in addressing existing disparities and fostering socio-economic development. However, realizing this potential requires overcoming infrastructural, technical, ethical, and policy challenges. Strategic investments, stakeholder engagement, and contextually tailored solutions are essential to ensure AI's equitable and sustainable integration in Nigerian education.

Methodology

The study adopted a correlational design. The accessible population of this study comprises all the lecturer in universities in Southeast, 634 lecturers from 6 federal universities in southeast. The universities studied were University of Nigeria Nsukka (151 lecturers), Michael Okpara University of Agriculture Umudike (161 lecturers), Alex Ekwueme Federal University Ndufu Alike Ikwo (106 lecturers), Abia State University Uturu (56 lecturers), Imo State University Owerri (95 lecturers) and Ebonyi State University, Abakaliki (65 lecturers). (Personnel Administration Department MOUAU, AEFUNAI, UNN, ABSU, EBSU and IMSU). The sample size for this study was 317 lecturers which represented 50% of the population. This consisted of 75 lecturers from UNN, 80 lecturers from MOUAU, 53 lecturers from FUNAI, 28 lecturers from ABSU, 48 lecturers from IMSU and 33 lecturers from EBSU. The sample was arrived at using four-staged sampling technique. Instrument for data collection was structured questionnaire

A total of 317 copies of the questionnaire were distributed to lecturers in public universities in south east, Nigeria. Two hundred and fifty-nine copies of the questionnaire were completed and returned from public universities studied. This gave 81.7% of the return rate of the questionnaire administered to the respondents. More so, the remaining 58 copies of the questionnaire showed that 17 copies were not adequately filled and completed which gave 5.3% not returned while 41

copies of the questionnaire were not retrieved from the respondents which gave 13%. In all, the percentage of unreturned questionnaire stood at 18.3%.

Results

Research Question One

How do AI-driven learning platforms influence digital inclusion and educational access among learners in Nigeria?

Table 1: Correlation Matrix of AI-driven learning platforms influence digital inclusion and educational access among learners in Nigeria.

		MACS	LIE
MACS	Pearson Correlation	1	.404**
	Sig. (2-tailed)		.000
	N	259	259
LIE	Pearson Correlation	.404**	1
	Sig. (2-tailed)	.000	
	R ²	.163	
	N	259	259

**. Correlation is significant at the 0.05 level (2-tailed).

a. Predictors: (Constant), MACS

b. Dependent Variable: LIE

Data on table 1 indicated a correlation coefficient (r) of .404 which is a positive correlation and is within the coefficient limit of +/-0.40 to 0.69 as Moderate/Medium Extent relationship. This indicates that AI-driven learning platforms influence digital inclusion and educational access among learners in Nigeria to a positive moderate extent relates with lecturers instructional effectiveness in public universities in south east Nigeria. The coefficient determination (R²) .163 indicates that 16.3% of the variance observed in competence level using mobile apps technology is explained by the variation in lecturers instructional effectiveness. It implies that lecturers' competence in utilizing mobile application technologies to a positive moderate extent correlate with lecturer's instructional effectiveness in public universities in south east, Nigeria.

HYPOTHESIS ONE: There is no significant relationship between lecturers' on the use of AI-driven learning platforms significantly improves access to quality education for marginalized groups in Nigeria.

Table 2: Regression Analysis of Relationship between lecturers' on the use of AI-driven learning platforms significantly improves access to quality education for marginalized groups in Nigeria.

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	31.301	1	31.301	50.058	.000 ^a
	Residual	160.699	258	.625		
	Total	192.000	259			

a. Predictors: (Constant), MACS

b. Dependent Variable: LIE

Df = degree of freedom, F = F-calculated, correlation is significant at 0.05 level (2 tailed)

Data on table 2 revealed that F-calculated value of 50.058 at 0.05 level of significance. The table also shows that the P-value of .000^a which is less than the alpha value at 0.05; thus, null hypothesis which states that There is no significant relationship between key barriers and facilitators affecting the adoption of AI-driven learning systems in Nigerian educational institutions. This means that adoption of AI-driven learning systems in Nigerian educational institutions significantly relate with lecturers instructional effectiveness in public universities in South East, Nigeria.

Research Question Two:

What are the key barriers and facilitators affecting the adoption of AI-driven learning systems in Nigerian educational institutions?

Table 3: Correlation Matrix of key barriers and facilitators affecting the adoption of AI-driven learning

		MALE	LIE
AID	Pearson Correlation	1	.336 ^{**}
	Sig. (2-tailed)		.000
	N	259	259
LS	Pearson Correlation	.336 ^{**}	1
	Sig. (2-tailed)	.000	
	R ²	.113	
	N	259	259

cant at the 0.05 level (2-tailed) AID= Artificial Intelligence Driven and LIE= Lecturers Instructional Effectiveness

systems in Nigerian educational institutions

Data on table 3 indicated a correlation coefficient (r) of .336 which is a positive correlation and is within the coefficient limit of +/-0.00 to 0.33 indicating no correlation/ weak/low extent relationship. This indicates that effective communication in managing learning strategy to a positive low extent relates with lecturers instructional effectiveness in public universities in south east, Nigeria. The coefficient determination (R²) .113 indicates that 11.3% of the variance observed as observed in effective classroom communication strategy is explained in the variation in lecturers instructional effectiveness. It implies that effective classroom communication in managing learning

strategy has a positive weak relationship with lecturers instructional effectiveness in public universities in south east, Nigeria.

HYPOTHESIS TWO:

Factors such as infrastructural readiness, digital literacy, and contextual relevance significantly influence the adoption of AI-driven learning systems in Nigeria.

Table 4: Regression Analysis of Relationship Between Factors such as infrastructural readiness, digital literacy, and contextual relevance significantly influence the adoption of AI-driven learning systems in Nigeria

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	21.405	1	21.405	32.678	.000 ^a
	Residual	168.347	258	.655		
	Total	189.752	259			

a. Predictors: (Constant), CCS

b. Dependent Variable: LIE

Df = degree of freedom, F = F-calculated, correlation is significant at 0.05 level (2 tailed)

Data in table 4 revealed that F-calculated value of 32.678 at 0.05 level of significance. The table also shows that the P-value of .000^a which is less than the alpha value at 0.05; thus, null hypothesis which states that There is no significant relationship between Factors such as infrastructural readiness, digital literacy, and contextual relevance significantly influence the adoption of AI-driven learning systems in Nigeria universities in South East, Nigeria was rejected. This mean that Factors such as infrastructural readiness, digital literacy, and contextual relevance significantly influence the adoption of AI-driven learning systems in Nigeria

Findings of the Study

The findings revealed to inform policymakers, educators, and technology developers on strategies to leverage AI for equitable access to quality education, fostering lifelong learning and socio-economic development. Ultimately, this research contributes to bridging the digital divide in Nigeria's education system and advancing the nation's vision of inclusive and sustainable development.

Summary

This research explores the potential of Artificial Intelligence (AI)-driven learning platform systems to advance sustainable digital inclusion in Nigeria's education sector. Despite Nigeria's demographic advantages, the country faces persistent challenges such as inadequate infrastructure, teacher shortages, and significant disparities in educational access and quality, especially between urban and rural areas. AI offers transformative solutions by enabling personalized learning, improving educational outcomes, and expanding access to underserved populations. The analysis highlights that while pilot projects and emerging initiatives demonstrate promising results,

numerous barriers such as infrastructural deficits, limited local expertise, policy gaps, and socio-cultural challenges hinder widespread adoption of AI in

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education. Addressing these barriers requires strategic investments in infrastructure, capacity building, ethical policymaking, and culturally relevant AI content. Opportunities for sustainable digital inclusion include deploying scalable, low-cost AI applications—particularly mobile-based platforms—that accommodate Nigeria’s linguistic diversity and infrastructural constraints. Collaboration among government, private sector, and international partners is crucial for fostering innovation and ensuring long-term impact. The findings underscore that integrating AI in Nigeria’s education system can enhance inclusivity, improve learning outcomes, and contribute to socio-economic development. To achieve these goals, policymakers must prioritize strategic frameworks, infrastructural enhancement, and stakeholder engagement to harness AI’s full potential for equitable and sustainable educational advancement.

Recommendations

Based on the findings, the following recommendations were made:

Develop Contextually Relevant Content: AI platforms should incorporate local languages, cultural contexts, and curriculum standards to enhance usability and engagement among Nigerian learners.

Improve Infrastructure and Access: Invest in expanding internet connectivity, devices, and electricity to ensure broader accessibility, especially in rural and underserved areas.

Enhance Digital Literacy: Implement training programs for educators, students, and parents to build confidence and capability in using AI-driven educational tools effectively.

Policy Support and Collaboration: Encourage government policies that promote digital inclusion and foster partnerships between educational institutions, tech developers, and NGOs to scale AI solutions sustainably.

Monitor and Evaluate Impact: Establish continuous assessment mechanisms to measure effectiveness, gather user feedback, and adapt platforms to improve relevance and impact.

Promote Sustainable and Inclusive Practices: Prioritize affordability, ease of use, and accessibility features to ensure all learners, regardless of socio-economic status, can benefit from AI-driven education.

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