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Artificial Intelligence and Inclusive Education: Bridging the Gaps for Equitable Learning and Sustainable Development in Nigeria

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Abstract

This paper examines the transformative role of Artificial Intelligence (AI) in promoting inclusive and equitable education and sustainable development in Nigeria. Drawing on the Universal Design for Learning (UDL) framework, Vygotsky's socio-cultural theory, Equity and Social Justice theory, and Sustainable Development Theory, the paper highlights the potential of AI in education and emphasizes the urgency for Nigeria to adopt AI-driven strategies to bridge learning gaps and prepare its youth for an evolving global economy. Key challenges identified include digital divide, inadequate funding, outdated curricula, limited teacher capacity, infrastructural deficits, regulatory constraints, among others. Strategic recommendations proposed include a holistic review of Nigeria's AI strategies, investment in digital infrastructure and research, teacher professional development, integration of AI into STEM education, renewable energy adoption, among others. Ultimately, embracing AI in education is a national priority that also requires ethical, strategic, and innovative leadership to implement, stimulate and drive sustainable development in Nigeria.

Keywords: *Artificial intelligence in education, Quality education, Inclusive education, STEM education, Digital literacy, Sustainable development*

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Background to the Study

By the account of political history, human civilisation has experienced four industrial revolutions, namely the First Industrial Revolution, also called the Mechanical Revolution (1760s–1840s), heralding the introduction of steam machines, the use of coal as a major source of energy, and the mechanisation of agricultural and textile production. It helped to strengthen and accelerate the development of capitalism. The Second Industrial Revolution, or Technological Revolution (1870s–1914), came with the wide use of electricity, the invention of light bulbs, the telephone, the automobile, modern transport and communication, faster production and the expansion of international trade. The Third Industrial Revolution was the era of the Digital Revolution (1960s–2000s) – the rise of computers, microprocessors, electronics, the internet, mobile phones, automation and information and communication technology, especially digital communication. The period was generally referred to as the information age (Aston, 1948; Gordon, 2016; Freeman and Louca, 2001; Osai et al., 2025).

The world is currently in the deepening phase of the Fourth Industrial Revolution, characterised by technological transformation and advances in artificial intelligence, robotics and automation, biotechnology, genetic engineering and nanotechnology, among others. The revolution is rapidly reshaping the world and integrating technologies into every part of human life and activity – politics and governance, education, health, security, the economy, environment and work, etc. Some scholars even contend that the world may be transitioning into the Fifth Industrial Revolution, which emphasises human–machine collaboration and sustainability (Schwab, 2016).

Undoubtedly, Artificial Intelligence (AI) appears to be the new global normal. It is revolutionising all facets of human life, including education. There is a global shift to AI in education as a veritable means of facilitating inclusive education, bridging the gap for equitable learning and driving development globally. It is also gradually gathering more momentum, gaining enhanced popularity and rapidly being embraced by governments, education development partners/agencies, the private sector, educational institutions, professional associations, teachers, lecturers, students at various levels of the educational ladder, communities and the wider public.

Nigeria, like many LAAA (Latin American, Asian and African) countries, is faced with multidimensional and complex development challenges – economic, social, cultural, political, technological, security, environmental and educational, etc. These challenges require new thinking, new approaches or perspectives and strategic methodology. With the rapid advancement in technologies, especially since the beginning of the 21st century, and the growing demands for digital knowledge, practical and problem-solving skills, there is an indispensable need to rethink, focus more attention on, and prioritise the application of artificial intelligence to achieve inclusive education and sustainable development in Nigeria. This is especially true given that the National Policy on Education (2014) is based on the ideas that education is a tool for transforming society and national development, among other things, and that one of the particular objectives of education in Nigeria is to guarantee quality education at all levels.

Artificial Intelligence, which is generally referred to as "AI", being a subset of computer science, is concerned with the creation of machines and software with the capacities to perform functions or tasks that ordinarily require human intelligence. Such capacities include reasoning ability, learning, decoding or understanding language, problem-solving skills, decision-making, recognising patterns, and understanding and interacting with humans, etc. Inclusive education is mainly about fairness and equal access to education without exception and irrespective of gender, disability, creed, socio-economic status, language, class, race or ethnicity, pace or learning ability, and unfettered access to quality education. In the light of the foregoing, this paper interrogates and analyses how artificial intelligence can be used to achieve inclusive education for sustainable development in Nigeria.

Statement of the Problem

Despite the acclaimed benefits of AI and its relevance to education and sustainable development, there is still a wide digital divide, and inclusive education in Nigeria is yet to be achieved, as many persons (children) still do not have access to quality education. This is exacerbated by the increasing insecurity in many parts of the country, notably in the North East, North West, South East and other regions (Kalagbor, 2024b). The United Nations Children's Fund (UNICEF) estimates that 18.3 million Nigerian children did not attend school in 2024; of these, 10.2 million were in primary school and 8.1 million were in junior secondary school. In total, this amount represented 15% of all out-of-school children worldwide and 26% of Nigerian children, which is likely the highest percentage of out-of-school children worldwide (UNICEF, 2024).

Aside from insecurity, other factors responsible for the increasing number of out-of-school children in Nigeria include poverty, underfunding of education at all levels (non-compliance with the 26% annual budget benchmark by UNESCO), thereby leading to poor and insufficient infrastructure and facilities; lack of teachers; irregular training and professional development of teachers; poor remuneration and conditions of service; incessant strikes by teachers and lecturers; and regional disparities and inequalities, and poor quality of students/graduates etc. These have far-reaching implications for producing and mobilising competent and resourceful human resources to drive sustainable socio-economic and political development in Nigeria.

Aim and Objectives

The main aim of this paper is to examine artificial intelligence and inclusive education and how they bridge the gap for equitable learning and sustainable development in Nigeria. The specific objectives include:

1. How can artificial intelligence be used or applied to enhance inclusive education in diverse learning environments and sustainable development in Nigeria?
2. How can artificial intelligence be applied to bridge existing gaps in inclusive education systems or settings and sustainable development in Nigeria?
3. What learning gaps and challenges exist with respect to the integration of AI into inclusive education and sustainable development in Nigeria?

Methodology

The study adopts a qualitative research approach and relies on secondary sources of data collection and literature such as books, academic journal articles, encyclopaedias, institutional reports and documents, policy documents, online sources and other materials that are relevant to the subject matter or topic. For the purpose of analysis, interpretation and drawing conclusions from collected data and extraction of meaningful and reliable research findings, the study adopted the content analysis method.

Theoretical Perspectives or Prisms

For the purpose of critical theoretical and practical depth, a combination of four complementary frameworks is adopted, namely the Universal Design for Learning (UDL) Framework, Vygotsky's Socio-cultural Theory (ZPD), Equity and Social Justice Theory, and Sustainable Development Theory. Key proponents of the Universal Design for Learning (UDL) framework include David H. Rose, Anne Meyer and the Centre for Applied Special Technology (CAST), a non-profit education research and development organisation founded in 1984, and the United Nations Educational, Scientific and Cultural Organisation (UNESCO). UDL is a framework which guides teachers or educators in designing or developing adaptable, accessible and inclusive learning experiences that meet or satisfy the needs of all learners. UDL aligns with AI and reinforces its potential for inclusive education and equitable learning because AI provides multiple means of learning for learners, personalises learning, and can present the subject being learnt by using various formats.

Lev Vygotsky's socio-cultural theory and Zone of Proximal Development (ZPD) emphasise that learning is social and cultural and that thinking and learning are influenced by interactions with others and the use of cultural tools such as language and symbols, etc. Through guided interactions referred to as "scaffolding", learners receive support at the points of need, gradually acquiring skills until they can operate independently (Crawford, 1996; Berk, 1994). AI facilitates social interactions and collaborative learning, admits mediating learning through the use of cultural tools such as language, symbols, writing and technology, personalises learning and enhances inclusive education.

Equity and Social Justice Theory focuses on fairness and equal access and opportunity for all individuals and social groups and examines whether AI can be used to promote or constrain educational equity. The theory advocates the need to provide support and resources to meet the needs of individuals by ensuring that all learners have access to quality education irrespective of their identity, ability, status or other considerations. Some notable equity and social justice theorists include Nancy Fraser and John Rawls (Hatley, 2023; Rentzi, 2024). Sustainable development theory is the product of individual scholars and institutional contributions and responses to deal with the multidimensional challenges of development. The theory analyses how to drive economic growth and human development and, at the same time, ensure that environmental resources are preserved for the use and benefit of future generations. Its major scholars include Gro Harlem Brundtland, regarded as the mother of sustainable development, Amartya Sen, Herman Daly, and Robert Solow. Its institutional proponents are the United Nations Development Programme (UNDP), the United Nations,

and the World Commission on Environment and Development (WCED). The five key assumptions of sustainable development theory are resource conservation, poverty reduction, intergenerational equity, institutional responsibility, and integrated development. The core principles of the theory include long-term planning, responsible governance, social justice, environmental protection, inclusive economic growth, and education and awareness (Todaro and Smith, 2015).

Notwithstanding that the theory has been severely criticized for being too expensive, fuzzy, and lacking clear operational standards, its relevance to this study cannot be neglected or dismissed. First, the theory sees education (for example, Sustainable Development Goal (SDG) number 4 on quality education) as foundational and strategic to sustainable development. Second, it is through the instrumentality of education and training that human capital or human resources can be developed, harnessed, and modernised for the transformation of man and society through the enhancement of the general welfare and well-being of the people. Third, investment in the provision of quality education facilitates productivity and the actualisation of the goals of sustainable development. The 2025 Sustainable Development Report ranks Finland as the most sustainable country in the world, followed by Sweden, Denmark, and Germany. Nigeria is ranked 147 out of 167 countries that were assessed. From the above and the combination of the four theoretical perspectives, it can be seen that they cover pedagogy and learning processes, technology adoption (in this case, the application of AI tools to inclusive education), accessibility, equity and social justice and sustainable development.

Conceptual Review and Clarification

The key concepts of this paper—namely, Artificial Intelligence (AI), quality education inclusive education, and sustainable development—will be examined.

Artificial Intelligence (AI)

The importance of technology in the transformation and advancement of human society cannot be negated. Technology involves the application of scientific knowledge, tools, techniques, processes and systems to solve practical problems in order to actualize specific purposes. More often than not, economies and societies, consciously or otherwise, respond to technological change or innovation rather than directing or influencing it (Arthur, 2009; Kalagbor, 2025). As an interdisciplinary field of study, artificial intelligence draws knowledge and other inputs from academic disciplines other than computer science and mathematics, including economics, linguistics, psychology, engineering, neuroscience, law and philosophy, etc. Artificial Intelligence (AI) is a technological tool which has exerted tremendous impacts—negative and positive—on human civilisation, progress and society. Its impacts are so profound that Darity (2008) noted Ray Kurzweil's prognostication, although debatable, "that artificial intelligence will surpass human intelligence" (p. 61).

In contemporary history, the origin of AI is generally linked to Alan Turing, a British mathematician, logician and computer scientist, in 1950. He is generally regarded as the father of AI. In his foundational work titled "Computing Machinery and Intelligence", Turing

proposed and evaluated the ability of a machine to exhibit the intelligence of humans. The term "AI" was therefore coined by Marvin Minsky, Nathaniel Rochester, John McCarthy, and Claude Shannon at the Dartmouth Summer Research Project in 1956 in the United States of America (McCarthy, Minsky, Rochester & Shannon, 1956).

There is no monolithic and universally accepted definition of AI. Various scholars' definitions emphasise and reflect different contexts such as capability, behaviour, formality, measurability, learning and engineering, etc. Artificial intelligence is a form of "human-made imitation of natural intelligence" or exhibition of intelligent behaviour similar or equivalent to that of humans (Bathgate, 2023, p. 11). Encyclopaedia Britannica (online) defines AI as the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. These intelligence processes include reasoning, identifying meanings, generalisation, and experience-based learning.

Zuniga, Goyanes and Durotoye (2023) are of the view that there are two dimensions or levels of AI: level of performance AI, focusing on tasks, decisions and predictions; and level of autonomy AI, stressing degree of human input, interaction and supervision.

Similarly, Ryder and Naren (2023) have classified AI into three categories:

a) Artificial Narrow Intelligence – "copying human capabilities in specific domains" (p. 2). This is regarded as weak AI and includes Siri, Google Translate and ChatGPT.
b) General Intelligence – this is regarded as strong AI but is still theoretical and debated regarding its feasibility and ethical considerations.
c) Artificial Superintelligence – this exceeds human intelligence and capabilities and raises fundamental and sensitive existential questions.

According to Bilbis (2024), AI can be summed up as follows: A subfield of computer science called artificial intelligence (AI) focuses on developing technologies and systems that can carry out tasks that normally require human intelligence. Problem-solving, decision-making, learning, reasoning, and language understanding are some of these tasks. In order to imitate human behaviour and make predictions or judgements without explicit human guidance, artificial intelligence (AI) systems rely on sophisticated algorithms, data processing techniques, and computational capacity.

He identified five (5) principal subfields of AI, namely:

i. Machine Learning (ML)
ii. Natural Language Processing (NLP)
iii. Computer Vision (CV)
iv. Robotics (R)
v. Deep Learning

Understanding Quality Education and Inclusive Education
What is Education?

Education is a social good and one of the greatest and longest-term investments in human capital; an inestimable and invaluable treasure and the foundation upon which individual,

group, state and societal progress, prosperity and sustainable development largely depend. It increases knowledge, skills, productivity and income over time (high returns). It is also a potent instrument of social transformation, ethical reorientation, empowerment and national development (Kalagbor, 2002; Becker, 1994; Jakimovski, 2019). It is the process through which individuals acquire knowledge, skills, values, competencies and experiences to enable them to live a better life and contribute to the positive development of society. Education is the foundation for technological advancement and sustainable national development, including human progress and prosperity.

Okaro, Egbunike, and Obodo (2021) took a broad approach and characterised education as a social process that addresses the harmonious growth of all human capacities and skills, including mental, physical, moral, emotional, spiritual, and social. It gives the person the competencies, skills, and capacities that will improve both his own and society's overall well-being. It is widely acknowledged as the most crucial component for human development and can also be referred to as a process, a product, or a discipline. Education is a reliable instrument for empowerment.

In terms of classification, education can generally be categorised into formal education or learning, informal education and non-formal education. Education also takes place at pre-primary, primary, secondary and tertiary levels and in public and private institutions (Kalagbor, 2024a).

Structurally, the National Policy on Education (NPE) (2014) has provided a four-level structure for the Nigerian education system as follows:

1. Early Child Care and Development (0–4 years)
2. Basic Education (5–15 years): 1 year of pre-primary; 6 years of primary education and 3 years of junior secondary education
3. Post-Basic Education: 3 years in Senior Secondary School and Technical Colleges
4. Tertiary Education (colleges of education, monotechnics, polytechnics and universities)

Quality Education

The fourth Sustainable Development Goal (SDG) of the United Nations includes the inclusive term "quality education." With a predicted timeline of 2030, the United Nations views education as a human right and characterises quality education as that which is meant to provide inclusive and equitable quality education and encourage chances for continuous learning for everyone (United Nations, 2015). The ten comprehensive and universal targets of quality education are:

Core Targets

i. Target 4.1: Free, equitable and quality primary and secondary education
ii. Target 4.2: Equal access to quality pre-primary education
iii. Target 4.3: Equal access to affordable technical, vocational and higher or tertiary education

iv. Target 4.4: Increase the number of people (youths and adults) with relevant skills for employment, decent jobs, and entrepreneurship
v. Target 4.5: Eliminate all discrimination in education and ensure equal access to all levels of education
vi. Target 4.6: Universal literacy and numeracy
vii. Target 4.7: Education for sustainable development and global citizenship

Implementation Targets

i. Target 4a: Build and upgrade inclusive, safe schools and provide learning facilities
ii. Target 4b: Expand higher education scholarships for developing countries
iii. Target 4c: Increase the supply of qualified teachers in developing countries through training and international cooperation (United Nations, n.d.; UNESCO, 2018)

UNESCO has defined quality education as "education that is inclusive, equitable, relevant, and of a standard that promotes the full development of the learner" (UNESCO, 2025, pp. 13–15). Essentially, a combined interpretation of the policy frameworks and definitions of quality education by both the United Nations and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) reveals that quality education must be accessible and equitable to all, inclusive, and ensure learning that seeks to develop not only knowledge but also the skills, values, attitudes, well-being and social competence of learners. It must also be safe, well-resourced and supportive of learning environments; relevant to present and future needs, society's demands, global citizenship and sustainability; and provide lifelong learning opportunities and learner-centred pedagogy, including competent teachers.

UNESCO (2000) has identified five critical dimensions of quality education, namely:

1. Learners – emphasising the health, nutrition and readiness of learners
2. Learning environment – focusing on safety, resources and equity
3. Content – highlighting relevance, literacy and diverse skills
4. Processes – stressing teacher competence, quality and pedagogy
5. Outcomes – concerned with skills, attitudes and values that align with learners' lives, present and future needs of society and the global community (UNESCO, 2000, pp. 7–11)

Inclusive Education

Inclusivity or inclusion is the foundation and a major key to the actualisation of the goals of quality education for all. To this end, inclusive education constitutes an integral, indispensable and non-negotiable part of quality education. Ipso facto, quality education cannot be achieved without the inclusion of all social categories of learners, irrespective of their circumstances or conditions.

UNESCO, UNICEF and various scholars have defined inclusive education to reflect the commonality of certain variables or features. A consolidated or synthesised definition of inclusive education is an all-embracing educational approach, strategy or process that ensures

that all learners— notwithstanding their ability, disability, background, gender, socio-economic status, language, creed or other circumstances or conditions—learn together in mainstream settings or environments, with appropriate support, accommodation and teaching methods that eliminate all forms of barriers and promote full and integrated participation and equitable outcomes (UNESCO, 1994; UNESCO, 2005; UNICEF, 2014; Booth & Ainscow, 2002).

Inclusive education is non-discriminatory, provides equal learning opportunities for all learners and is participatory, accommodating all learners, including children with disabilities, gifted children, street and working children, minority and majority groups, rural or urban, rich or poor, advantaged or disadvantaged learners. The enactment of the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018, is intended, inter alia, to promote inclusive education in Nigeria.

UNESCO, UNICEF and frontline inclusive education scholars such as Booth, Ainscow and Florian have identified the following ten (10) cardinal characteristics of inclusive education:

1. Recognition, value and respect for learner diversity
2. Integrated learning or learning together
3. Active participation and engagement of all and diverse learners
4. Dynamic, flexible, responsive and differentiated teaching methods, including the application of Universal Design for Learning (UDL), scaffolding and assistive technology (AT) — devices, equipment, software or tools that help individuals with disabilities, impairment, injuries or limitations to participate fully in life, perform tasks and access information, including overcoming learning challenges.
5. Elimination of all forms of barriers to learning
6. High expectations for all learners
7. Collaborative support systems by critical multi-stakeholders—teachers, community, parents, guardians and caregivers; government; regulatory agencies; educational leaders, administrators and institutions; development partners/agencies; professional bodies; PTAs; alumni associations; international organisations; the general public, etc.
8. Child-centred and rights-based approach
9. Adapted curriculum and assessment, including flexible curriculum and assessment and continuous assessment formats or methods
10. Safe, accepting and supportive school environment (UNESCO, 1994, 2005; Booth & Ainscow, 2002; UNICEF, 2014; Florian, 2014)

Sustainable Development

Sustainable development is multidimensional. Generally, it refers to qualitative improvement in the material and existential conditions and standards of living or welfare and well-being of people and society. It can be measured in terms of the availability of and access to basic needs and services such as food, clothing, health, education, housing, and security. It also involves the creation of productive employment, wealth creation, and poverty reduction (Angaye, 1995; Kalagbor, 2014; 2025). In a similar vein, Todaro and Smith (2015) assert that

development is the process of boosting people's standards of living, self-esteem, and freedom in order to improve the quality of all human lives and capacities. According to Ake (1996), development is not a project but rather a process through which individuals construct and renew themselves and their life circumstances in order to attain greater levels of civilisation in keeping with their own choices and beliefs. There are various levels of development: individual, local, national, subnational, regional, and international or global development. Key dimensions of development include physical development, economic development, social development, environmental development, spiritual development, political development, and educational development.

Sustainable development is defined by the United Nations World Commission on Environment and Development (WCED, 1987) as development that satisfies current demands without jeopardising the capacity of future generations to satisfy their own. In essence, it aims to combine human potential and equality with the economic, social, and environmental aspects of development. According to Todaro and Smith (2015), sustainable development can also be described as a pattern of growth that allows future generations to live at least as much as the present generation, usually necessitating at least a minimum of ecological protection. The four pillars of sustainable development include economic sustainability, social sustainability, environmental sustainability, and human sustainability. The overall goals of sustainable development have undergone fundamental transformation, particularly from the Millennium Development Goals (MDGs) to the Sustainable Development Goals (SDGs) (WCED, 1987).

The Role of AI in Education

Artificial intelligence is becoming practical and applicable in many fields, including education. Miller (2023) has declared unequivocally that we must prepare students for the reality that artificial intelligence is likely to bring about in the near future. Thus, in a technology-driven world coupled with globalisation, integrating AI into education is certainly not an alternative but a necessity that must be embraced and appreciated. To this end, education has been globally recognised both as a human right and a strong and viable process of social inclusion.

AI provides many opportunities and roles, including:

1. Personalised or individualised learning through various platforms, including the application of AI technologies such as Natural Language Processing (NLP) and Machine Learning
2. Intelligent Tutoring Systems (ITS)
3. Content creation and accessibility, for instance ScribeSense and the use of LexisNexis and Westlaw Edge in legal research
4. Predictive analytics
5. Administrative automation
6. Generative AI, using tools such as ChatGPT and DALL·E; it enhances deep learning and interactive learning
7. Learning Management Systems (LMS), such as Google Classroom, Microsoft Teams, Moodle and Blackboard

8. Robotics (educational robotics such as LEGO Mindstorms, VEX Robotics, Raspberry Pi, Arduino, Nao, Pepper and collaborative robots). Robotics are very important and relevant in STEM (Science, Technology, Engineering and Mathematics) education
9. Internet of Things (IoT) (Bilbis, 2024; Bathgate, 2023; Chen & Chen, 2020).

AI is a transformative driver and strong enabler of inclusive education and equitable learning globally. With respect to Nigeria, it has the capacity to completely revolutionise the Nigerian education system, fast-track the realisation of the goals of inclusive education, upskill the population by generating multi-skilled and competent manpower capable of diversifying and revitalising Nigeria's ailing economy for sustainable development, and provide visionary, ethical and transformational political leadership.

Many countries have effectively integrated AI into their education systems and used it to accelerate inclusivity and equity in education. Prominent among them are Singapore, Finland, the United States (regarded as the number one global market leader in AI), Japan, South Korea and India. Others are China, Australia, Hong Kong and the United Arab Emirates. By personalising education, liberalising and enhancing access to AI technologies in education, making massive investments in digital research and development, including digital infrastructure and strong support for teacher digital training and development, these countries repositioned their education systems through AI technologies or AI-powered education.

Notwithstanding that Nigeria has made some efforts in the area of AI, such as the launching of the Nigeria Artificial Intelligence Research Scheme (NAIRS), the National AI Strategy in 2024 and the establishment of the National Centre for Artificial Intelligence and Robotics (NCAIR), among others, more efforts need to be made by governments—federal, state and local— including partnerships with the private sector, academia and relevant international institutions and organisations.

Learning Gaps, Challenges, and Sustainable Development

The following constitute formidable challenges to the integration of AI into the implementation of inclusive education and equitable learning in Nigeria's education system necessary for driving sustainable development:

1. Inability of the fragmented legal and institutional frameworks and policy instruments to specifically drive AI-powered inclusive education and equitable learning systems. Nigeria's foundational or preliminary efforts at institutionalization of AI are relatively recent. The NCAIR was commissioned in November, 2020; NAIRS was launched in October, 2023, while the National AI Strategy (NAIS) was launched in August 2024. A Draft Code of Practice for AI was released by the National Information Technology Development Agency (NITDA) in July, 2025. There appears to be no comprehensive AI-specific legislation at the moment in Nigeria devoted to AI governance. However, there are some draft bills before the National Assembly. There is also a lack of a unified roadmap for AI adoption in the country.
2. Digital divide, largely and negatively affects older generations of Nigerians, ungoverned and rural/urban communities, and out-of-school children.

3. Ethical questions, data privacy implications, religious and socio-cultural barriers, and resistance to the implementation of AI-driven education.
4. Poor funding of education, especially in terms of investments in digital infrastructure, research and development, manpower development, and teacher training and professional development.
5. Poor digital infrastructure, internet connectivity and modern computing hardware.
6. Energy poverty, including poor energy infrastructure resulting in epileptic supply of electricity in major urban centres, absence of electricity in many rural communities, over-reliance on fossil fuels, and poor and slow transitioning to alternative and clean energy sources such as gas and green energy to power AI technologies and solutions in schools and other institutions.
7. Anachronistic and outdated education curricula that are inconsistent with AI technologies and tools in education.
8. Unstable internet access and inadequate data storage facilities.
9. Paucity of AI-skilled professionals, teachers, lecturers, and administrators in the education sector.
10. Regulatory constraints and governance structures, especially in terms of commitment to the implementation of AI strategies in education.
11. Concerns about academic integrity, human laziness, lack of critical thinking, over-reliance on AI tools and disincentives to creativity (Obiakor & Umeh, 2025; Novianti, 2025; Samuel, Akorede & Karimu, 2025).
12. Insecurity in many parts of the country—sea piracy, kidnapping, banditry, insurgency, terrorism, farmer-herdsmen conflicts, militancy, separatist and secessionist agitation and ethno-religious conflicts. For instance, attacks on schools and kidnapping of students and teachers, including at Chibok, Dapchi, etc., destruction and closure of schools. Inclusive education cannot be realised in an atmosphere or climate of widespread insecurity. They constitute threats to national security and stability and undermine inclusive education.

Conclusion

In conclusion, this study has examined the transformative role of AI in promoting inclusive and equitable education and sustainable development in Nigeria. Having identified challenges faced in this regard and the strategic measures to be taken by all stakeholders, it is clear that Nigeria cannot afford to be left behind by not fully embracing AI education as a strategic means of attaining inclusive education for its citizens, stimulating, facilitating, and driving sustainable development. The holistic review of Nigeria's national AI strategy largely depends on the vision, willingness, and commitment of Nigeria's political leadership, and on effective transition in our schools to renewable energy sources, particularly solar power, to guarantee consistent and affordable access to digital tools and data storage. By embracing these strategic pathways with clarity, courage, and dedication, Nigeria can build an inclusive education system where every learner, regardless of background, geography, ability, disability, or circumstances, has the opportunity to thrive and flourish. That way, producing highly skilled, competent, dependable and resourceful manpower to drive Nigeria's development process can be guaranteed. The future of inclusive education will not be shaped by technology alone, but

by a collective resolve to harness AI responsibly, ethically, strategically, and inclusively, not only as a tool, but as a catalyst for transformation, empowerment, and sustainable development of Nigeria and Nigerians.

Recommendations

In light of the huge tasks ahead to integrate AI into inclusive education and equitable learning for sustainable development in Nigeria, the following strategies are proposed:

1. Holistic review of the national AI strategies (NAIS), institutional, legal, and regulatory frameworks, integration and alignment with the national policy on education, particularly inclusive education and equitable learning, formulation and adoption of a national AI policy for education.
2. Massive funding of education and investment in digital infrastructure, digital technology research and development. Overhaul Nigeria's education curricula at all levels to make them responsive to AI education, more practically oriented, and incorporate AI into STEM (science, technology, engineering, and mathematics) education. This will significantly help to overcome the digital divide among the active and youthful population, rural and urban communities, and across diverse social groups.
3. Continuous teacher training, empowerment and professional development with emphasis on digital literacy, digital learning, and pedagogical innovation.
4. Tackle the challenge of energy poverty by transitioning to renewable energy sources and solar-powered school environments. This will guarantee stable power for digital services.
5. Implement aggressive national AI literacy campaigns, sensitisation, enlightenment, reorientation, and mobilisation, especially among the vibrant youth population, on the need to embrace the application of AI in education. This, among others, is aimed at demystifying and encouraging practical application of AI (AI awareness and application).
6. Adopt AI institutional transformation mechanisms and adaptation to local needs and realities to boost AI education and introduce free AI online courses as a means of liberalisation and democratisation of AI education.
7. Give priority and support to special needs education, including the provision and distribution of assistive technological tools, software and devices to persons with disabilities. Such items should include wheelchairs, walkers, prosthetic limbs and hearing aids. Others are audiobooks, speech-to-text software, text-to-speech tools, smart pens, adaptive keyboards and cochlear implants. This will help to improve access to innovative and AI learning tools in education for learners for ease of implementation of inclusive AI education.
8. Restoration and enhancement of security, sustainable peace and stability in various regions of the country by the government.
9. Support partnerships between government, academia, and the private sector to promote AI education and encourage autonomous technological innovation, development, and local solutions.

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