

BASIC EDUCATION REFORM IN THE DIGITAL ERA: EXPLORING THE ROLE OF ARTIFICIAL INTELLIGENCE (AI) IN ENHANCING QUALITY BASIC EDUCATION IN NIGERIA

Dominic, Samaila; Sobowale Favour Mosunmola; Chukwuemeka Emeka Joshua; ¹Murtala Abubakar; Kudu, Salihu Muhammad; Shehu, Othman Abdullahi & Halilu, Ibrahim Usman

¹Waziri Umaru Federal Polytechnic, Birnin Kebbi,
Federal University of Technology Minna, Nigeria

Email: dominicsammy11@gmail.com, **Phone No:** +234 703 062 3182

Abstract

The urgency of re-engineering the education system has reached unprecedented level in today's world. This imperative arises from the lightning-fast pace of digital technology progress, the dynamic evolution of societal demands, and the ever-changing landscape of pedagogical theories. These factors collectively emphasize the imperative to rethink education delivery systems, reimagine learning environments, and embrace innovation to confront the multifaceted challenges of the contemporary world. This position paper explores diverse role of AI on reform and excellence in basic education, delving into their significance, outlining pivotal strategies, and illuminating the potential advantages they hold. As we live in this era of digitization, the transformation of basic education becomes not just a necessity but an attribute of hope, guiding us toward a future of empowered individuals and a thriving nation.

Keywords: *Digital Era, Artificial Intelligence, Basic Education Reform*

Introduction

The world is progressing very rapidly due to the development in Information and Communication technology (ICT) that is currently been experienced globally. This is characterized by highly advance digital technologies like Artificial Intelligence (AI), Internet of Things (IT), robotics engineering, Virtual Reality (VR) and digitization that brings about transformation of different sectors of the economy, including agriculture, commerce, health, politics and education across the globe.

There has been a growing recognition of the critical role that digital technology plays in shaping and improving various aspects of our lives. From communication to healthcare, from agriculture to sports, technology has revolutionized the way we operate and interact with the world. In the field of education, the impact of technology has been particularly significant, with its potential to transform the traditional teaching and learning approach and enhance academic outcomes (Onyanabo, 2024). However, in the context of Nigeria, this transformation through the use of technology tools has not had the same far-reaching and sustainable effect on education as in other countries of the world. Adeoye and Alabi (2022) reported that there have been isolated pockets of success and good practice, largely at the other levels leaving behind the basic education level.

Basic education is the foundational education crucial for national development. In Nigeria, basic education is encompassing primary and junior secondary education. Governed by the Universal Basic Education (UBE) Act of 2004, its goal is to provide free, compulsory, and qualitative education for every child irrespective of location, economic status, or cultural background. However, despite its free and compulsory education policy, the basic education system in Nigeria

faces numerous and complex challenges. Most noticeable is the current teacher supply and quality gaps, infrastructural decay and resource constraints, and very unsatisfactory pupils' learning outcomes among others (Universal Basic Education Commission [UBEC], 2022). These challenges have fuel the growing need for reform, with the researchers calling for a transformation of basic education delivery system if Nigeria is to meet the dynamic demands of contemporary society.

As the world is undergoing a profound transformation, marked by a growing demand for skills rooted in the ability to understand, apply, and innovate with technology, there is need to bridge the gap between traditional education frameworks designed for the industrial age and the demands of 21st century learners and the evolving job market. Incorporating Artificial Intelligence (AI) into the curriculum will involve more than merely using computers in classrooms but a comprehensive overhaul of teaching pedagogies and learning objectives (Ganiyu *et al.*, 2024). Artificial Intelligence which is about the ability of machines or computer systems to mimic human intelligence and perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making among others is making significant impact in education.

AI tools have been incorporated into education system in order to address some of the challenges faced by the sector, particularly in areas of quality and access. Furthermore, its applications in education is basically tailored to promoting personalized learning, data-driven decision-making, and enhanced student engagement, and assessment among others. Chen *et al.* (2020) stressed further that the importance of AI is providing tailored educational experiences, helping students learn at their own pace and improving retention rates. With adaptive learning platforms, AI has the capacity to modify lessons in real-time based on individual student performance, offering customized feedback and learning materials. Olatunde-Aiyetunde *et al.* (2024) reiterates that AI tools could support teachers in managing large classes by automating grading, assessing student progress, and facilitating administrative tasks.

AI's potential in education is expanding beyond developed regions, with countries in Africa beginning to recognize its transformative capabilities. However, the application of AI in developing countries like Nigeria, is at its early stage and often hindered by limited funding which restricts the acquisition of necessary technologies and training for educators (Adebayo *et al.*, 2022; Eze & Olusola, 2023). Chukwuemeka *et al.* (2025) noted further that infrastructural limitations, such as unreliable internet connectivity, power shortages, and lack of AI-equipped devices, restrict the effective adoption of AI tools in Nigerian schools.

However, the quality of education particularly at the elementary level remains a pressing concern. The 2022 National Assessment of Learning Outcomes undertaken by UBEC (2022) revealed that over 50% of Primary 4 pupils could not read and comprehend a simple text, and 60% lacked basic numeracy skills. The situation is still far from better as revealed in 2024 UNICEF report on the state of education in Nigeria. This crisis is compounded by a pupil-to-teacher ratio that often exceeds 50:1, insufficient instructional materials, and persistent and students'/teachers' absenteeism (World Bank, 2024). These factors create a system where children are attending school but are not learning effectively, and many are out of school. Hence, the quality of education, particularly the basic education has been negatively affected, hindering the country's progress

towards achieving economic growth and sustainability. In this article, the researcher explores the role of artificial Intelligence in enhancing quality reform of the basic education in Nigeria.

Conceptualisation

Basic Education in Nigeria: A System in Need of Transformation

Basic education is the foundation of any education system. It is the education given to children aged 0-15 years. It includes 6 years of primary education and 3 years of Junior Secondary education. Equally, it covers special interventions directed at nomadic, pastoralist and migrant fisher-folks, mass literacy as well as the Almajiri and other vulnerable and excluded groups (Federal Ministry of Education 2024-2030 road map). The agency responsible for the implementation of basic education is the Universal Basic Education Commission (UBEC) at the federal level and State Universal Basic Education Board (SUBEB) at the state level. The Universal Basic Education (UBE) programme was designed to be a tool for achieving some of the “Education for All” goals as articulated in the Dakar Framework of Action (2000) (FME, 2024). These include:

1. Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children.
2. Ensuring that by 2015, all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, had access to, and completed, free and compulsory primary and junior secondary education of good quality.
3. Eliminating gender disparities in primary and junior secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls’ full and equal access to and achievement in basic education of good quality.
4. Improving all aspects of quality of education.
5. Ensuring excellence so that recognised and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.

Therefore, the basic education is fundamentally set to provide the child with diverse basic knowledge and skills for entrepreneurship, wealth creation and educational advancement (UBEC, 2022). However, the attainment of the objectives of basic education depends on provision of adequate infrastructure, effective planning, coordinated policy formulation and implementation, relevant and functional curriculum, massive investment on infrastructures and deployment of adequate qualified teachers to effectively deliver the curriculum (UBEC, 2022). Therefore, as we live in this era of digitization, the transformation of basic education becomes not just a necessity but an attribute of hope, guiding us toward a future of empowered individuals and a thriving nation.

Challenges of Basic Education in Nigeria

As instrumental as basic education is for individual and national development, it is not without challenges. Some of the major challenges of Basic Education in Nigeria identified in previous studies such as Adu and Opone (2020); the World Bank (2021), and FME (2024-2027), Roadmap include:

1. Teacher shortages, uneven quality of teaching, and lack of continuous professional development.
2. Teachers are not sufficiently equipped to implement the national curriculum.
3. Dilapidated and inadequate classrooms and others school structures.
4. Dearth of textbooks and other instructional materials.
5. Insufficient capacity at State and Local Government levels to implement fully UBE programmes.
6. Weak monitoring and evaluation systems.
7. Socio-cultural and economic barriers that create gender imbalance in basic education.
8. Low enrolment, retention and completion rates.
9. Insufficient deployment of educational technology in basic education delivery.
10. Over-emphasis on the cognitive over psychomotor and affective domains.

Hence, the system is characterized by a one-size-fits-all curriculum delivered in overcrowded classrooms, filled with individual learning paces and styles, leading to widespread disengagement, poor outcomes, and increase dropout.

Possible Ways of Addressing the Basic Education Challenges

The possible strategies and actions that need to be taken to address the challenges of basic education in Nigeria are:

1. Leverage the teacher training institutions to address current teacher supply gaps in basic education schools.
2. Leverage AI opportunities to enhance the quality of teachers, administrators and school supervisors in basic education schools.
3. Provide adequate educational technology resources, including bandwidth in teacher training institutions to enhance digital skills of educators.
4. Restructure the teaching and learning environment to be ICT-driven by providing classrooms in all schools, including special education with requisite ICT infrastructure and services.
5. Conduct adequate monitoring and evaluation to ensure that quality and set standards are maintained in Basic schools.
6. Undertake review of Basic Education curriculum and ensure a blended approach incorporated.
7. Encourage the use of AI to provide relevant and updated text books and other learning materials to ensure the attainment of the learning outcome benchmarks.
8. Provide training centres for entrepreneurship in Basic Education Schools
9. Engage the traditional and religious leaders to commit to high-level girl-child education advocacy in their various domains.

Understanding AI in Educational Context

Artificial Intelligence has to do with the ability of machines or computer systems to mimic human intelligence and perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making among others is making significant impact in education (Onyanabo, 2024). AI in Education is an interdisciplinary field that uses AI techniques like machine learning, natural language processing, and data analytics to solve educational problems. Its primary goal is to create adaptive learning environments that respond to the needs of

individual learners (Luckin *et al.*, 2022). The key AI technologies relevant to basic education identified include:

- a. **Intelligent Tutoring Systems (ITS):** Made up of computer systems that provide immediate and customized instruction or feedback to learners without human teacher intervention, ITS has the ability to guide a pupil through step-by-step process to solving a maths or any other problem. These AI "tutors" can provide 24/7 support, answering questions and guiding students through problems, which is crucial for reinforcing learning outside school hours (Graesser *et al.*, 2018).
- b. AI-powered software can assess a student's knowledge level and learning style, then deliver customized lessons and exercises (VanLehn, 2011).
- c. **Automated Assessment and Feedback:** AI can grade assignments and provide instant feedback, freeing up teachers to focus on adequate preparation of instruction (Wang *et al.*, 2020).
- d. **Natural Language Processing (NLP),** that enables machines to understand and generate human language. its powers applications like automated essay scoring, reading comprehension assistants, and language learning apps (e.g., chatbots for practicing English) to guide pupils to effective language learning.
- e. **Learning Analytics,** which has to do with the measurement, collection, analysis, and reporting of data about learners and their contexts to understand and optimize learning (Luckin *et al.*, 2022). It can identify at-risk pupils and predict learning gaps.

Role of Artificial Intelligence in Achieving Reform and Excellence in Basic Education in Nigeria

One of the key ways to improve the basic education system in Nigeria is the integration of educational technology like the AI. With the rapid growth of digital technology, pupils today are digital natives, and thus, require education in a format that best suit their learning styles. Variety of teaching and learning activities can be accomplished using artificial intelligence at the basic education level. From teaching and learning, and pupils support, to assessment and feedback, AI tools are adequately used to perform different educational services. The following are some roles AI can play in transforming basic education in Nigeria:

Enhancing Learning and Teaching: Educational technology resources, whether hardware, software, digital devices, and online resources can be used to create interactive and engaging learning experience for learners. Adu and Opone (2020) have opined that by implementing comprehensive education technology reforms, basic education schools can actively enhance teaching and learning, bridge the gap between theory and practice, and foster understanding and retention of complex concepts.

Provision of Personalized Learning Paths: AI approach is essentially supporting personalized learning to the specific needs, interests, and abilities of each student, which enables teachers to customize their teaching methods and create tailored lesson plans effectively (Luckin *et al.* 2022). This allows students to learn at their own pace and style, rather than adhering to a traditional system

of one-size-fits-all curriculum delivery system. For instance, an AI-powered platform like Nigeria's own Mavis Tutor can assess a pupil's current understanding of a topic like Fractions and then serve up customized lessons and practice exercises that match pupil's proficiency level (Oyelere et al., 2023). This approach can help to improve learning outcomes by tailoring education to the specific needs of each pupil and ensure that no child is left behind.

Developing Digital Literacy: Maguire (2023) have opined that integrating AI into the education like the basic education curriculum will help pupils develop essential digital literacy skills essential for their future careers and for effective participation in a digital society.

Bridging Educational Disparities: Implementation of educational technology and essentially AI support in basic education systems will play a pivotal role in bridging educational disparities and ensuring equitable access to quality education among marginalized minority groups, individuals with disabilities, and those from disadvantaged socioeconomic backgrounds (Olumorin et al., 2022). For instance, AI education support tools like the virtual classrooms can provide access to quality education for students in remote or underserved areas, where physical classrooms may be limited or non-existent. This can help bridge the gap in educational opportunities and significantly reduce the number of out of school children in Nigeria.

Improved Teaching Practices: AI tools can assist teachers in creating more effective instructional strategies by analysing data on student performance, identifying areas where additional support may be needed, and suggesting relevant teaching materials (Akinrinola & Chukwuma, 2024). This can help teachers tailor their teaching methods to the specific needs of their students, resulting in improved teaching practices and better student outcomes.

Improving Foundational Literacy and Numeracy

AI-powered applications can be game-changers for literacy and numeracy gaps currently being experienced in basic education schools. AI app like ReadAlong by Google, which uses speech recognition to help children learn to read, could be adapted to improve literacy in basic education schools in Nigeria. Similarly, adaptive learning games can make mastering basic numeracy skills engaging and interactive, providing immediate feedback that is crucial for early learning (Bakar *et al.*, 2023).

Enhanced Creativity and Critical Thinking

AI-powered educational tools can foster creativity and critical thinking skills in students by providing opportunities for problem-solving, analysis, and decision-making (Bakar *et al.*, 2023). Virtual simulations and interactive learning experiences can engage students in hands-on learning, allowing them to develop their creativity and critical thinking skills, which are essential for the workforce of the future.

Integration of AI technologies into basic education in Nigeria will offers a promising pathway to building a quality education. By leveraging technological tools and opportunities AI offer, Nigerian can overcome the existing challenges of basic education, while promoting academic excellence.

Considerations and Prerequisites for Successful Implementation of AI in Basic Education in Nigeria

Evidently, researches have shown that the integration of AI tools in Nigerian education has the potential to revolutionize the education landscape by providing innovative solutions to existing challenges and improving the quality and accessibility of education. However, there are several key considerations that need to be addressed for effective implementation and responsible use of AI in basic education in Nigeria.

Teacher Training and Capacity Building

The effective use of AI tools in education requires skilled educators who are proficient in using these technologies. However, lack of adequate training and capacity building opportunities for educators in Nigeria is a major treat to effective integrate AI tools into the basic education. This can hinder the full realization of the potential benefits of AI in education. A massive investment in professional development is required to build "AI readiness" and ensure teachers are co-designers of the process, not passive recipients (Eze *et al.*, 2024).

Data Privacy and Security

AI tools in education often rely on the collection and analysis of large amounts of data, including pupil's performance data and personal information. Ensuring the privacy and security of this data is crucial to protect the rights and interests of students and educators. There may be concerns about the misuse or unauthorized access to student data, and appropriate measures need to be in place to safeguard data privacy and security. In fact, Nigeria must develop and enforce robust data protection laws, like the Nigeria Data Protection Act (2023), specifically for the education in the basic education sector.

Ethical Considerations

AI raises ethical concerns in education, such as bias in algorithms, fairness, transparency, and accountability. AI models that worked on foreign data may not perform well in the Nigerian context, potentially reinforcing biases. Therefore, it is crucial to develop and train AI systems on locally relevant datasets. This is to ensure that AI tools are designed and implemented in an ethical manner, taking into consideration issues of bias, discrimination, and social impact. Ethical guidelines and frameworks should be in place to ensure responsible and ethical use of AI in basic education in Nigeria.

The Need for a Multi-Stakeholder Implementation Roadmap to Ensure Access and Equity

One of the major challenges that could limits the adoption of AI tools in Nigerian basic education is equitable access, particularly for students in rural and underserved areas with limited internet connectivity and technological infrastructure. There is a risk that if this challenge is not adequately taken into consideration the benefits of AI tools may only be accessible to students in urban areas or those with more resources, exacerbating existing disparities in basic education. Therefore, a multi-stakeholder implementation roadmap must be developed. The government must lead in policy formulation, infrastructure investment that will ensure provision solar-powered digital hubs for basic education schools, and funding research for locally developed AI education solutions. Also, the private sector need to partner with the government to develop affordable, offline-first AI tools that are contextually and culturally relevant to basic education.

Position Statement

This paper posits that for basic education to truly make a difference in achieving holistic excellence, it is vital to build a systematic and sustainable model for integrating digital innovations, including AI into basic education curriculum. This is because when AI is deployed strategically and equitably, it will present a transformative opportunity to leapfrog systemic barriers in education and directly enhance the quality, accessibility, and transformation of basic education in Nigeria. More so, the paper posits that for teachers to achieve academic excellence, AI should be viewed as a powerful assistive tool to augment teachers' efforts, not replace them, and to create more efficient and effective learning ecosystems. Therefore, effective teacher training to stay abreast of the development in AI and other educational technologies, is a catalyst for basic educational improvement, which ensures that educators contribute to its reform. Hence, enhancing the digital skills of teacher-educators is a vital step towards holistic reform of basic education in Nigeria.

Conclusion

This paper posits holistic reform and excellence in basic education, the role of digital educational technologies like the AI should not be overlooked. This is because not only does the use of AI enhanced teaching and improves learning outcomes, it provides learners with personalized education experiences, and offers possibilities to bridge the gap between theory and practice, while fostering problem solving skills, critical thinking skills and quality education. Hence, building a systematic and sustainable model for integrating digital innovation like AI can ensure holistic reform and excellence in basic education in Nigeria.

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