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Artificial Intelligence (AI) A Paradigm Shift for Sustainable Educational Development and Adjustment in Multicultural Society

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Abstract: Artificial Intelligence (AI) is considered as a field of computer science dedicated to creating an integrated machine capable of performing tasks that systematically requires human intelligence such as learning, reasoning, decision or problem-solving. It also refers to the simulation of human intelligence in machines that are programmed to think, learn, and make decisions like humans (ADETUTU, 2026) objectives: This issue aims to propose new ways of looking at education systems in terms of content, evaluation and assessments, pedagogy, the role of the teacher, and capturing and integrating voices of the youth in education systems. Curriculum development at the basic education is a foundational standard for greater advancement in Multicultural paradigm. The current focus has shifted from "using tech" to "integrating intelligence" that supports both the teacher and the learner. Recommendations: Integrating AI into classroom assessment offers the potential to enhance efficiency, objectivity, and pedagogical decision-making. The following assertions are made to have a robust foundational AI education in the country: Pilot Testing & Capacity Building Professional Development (TPD): Implement continuous, hands-on training for primary school teachers focusing on facilitation techniques, cross-curricular planning, and formative assessment. Conclusion: AI usage has emerged as an integral part of several sectors, altering the way businesses and personnel engage with technology. The rapid evolution of artificial intelligence within educational contexts presents significant opportunities for refining classroom assessment methodologies through the deployment o AI-driven instruments (Ayo, 2025).

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I. INTRODUCTION

Artificial Intelligence (AI) refers to systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the data they collect (Youth, 2025) The integration of AI for language acquisition in early education is advantageous as it would boost learners' involvement and enhance motivation. This is cited by (Benebo-Solomon, Wilhelmina, 2024).

Nigeria's primary education system currently is undergoing its most significant structural transformation. The Federal Ministry of Education and the Nigerian Educational Research and Development Council (NERDC) have officially transitioned to a "functional and skills-heavy" model designed to align with the global digital economy. The integration of Artificial Intelligence (AI) into early childhood and primary education is no longer a futuristic concept- it is a current reality that is reshaping how foundational skills are taught and measured (ADETUTU, 2026) .The following guides are examined for effective implementation and development into the national system:

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- Controlled Piloting: The process roll out the multidisciplinary framework in a select cluster of schools (e.g., urban vs. rural cohorts) to test feasibility.
- Iterative Feedback Loops: Gather real-time qualitative and quantitative feedback from teachers, pupils, and school administrators to refine learning materials. Scale-Up, Monitoring, and Evaluation (M&E).System-Wide Deployment: Phased scaling across local government areas, supported by instruction supervisors and mobile mentoring networks. Utilize both traditional metrics (attendance, standardized continuous assessment) and modern metrics (project portfolios, collaboration rubrics) to measure transformation.

Holmes etal,2012 cited by (Adenike A, Akinrotimi, TimililaJ Popoola,and IE,Udo, 2025)that the integration of Artificial Intelligence (AI) into Early Childhood Education (ECE) offers transformative potential to improve learning outcomes by enabling personalized learning, adaptive assessments, and real-time feedback In the early years (ages 3–5), the priority is social-emotional development and sensory-based learning. AI serves as a supportive background tool rather than a primary interface. (Silvia Cimino, Angelo Giovanni IcroMaremmani, Luca Cerniglia, 2025)

Speech and Language Support**:** children should have the capability to understand the basic functions of AI, especially when more well-designed. AI toys appear in their everyday experience. AI-driven tools can analyze a child's pronunciation and vocabulary in real-time through interactive storytelling, pronunciations, providing gentle corrections and personalized language-building exercises. (Jiahong Su, Davy Tsz Kit Ng, Samuel Kai Wah Chu, 2023)

Intelligent Play: The genre of games specifically designed to target the acquisition of knowledge that is generally useful or specific to an academic context is called learning games (Kim, 2021). Smart toys equipped with basic AI can adapt to a child's developmental stage, offering puzzles that increase in complexity only when the child is ready, fostering a "flow state" in play of gaming (Yahya Fikr and Mohamed Rhalma , 2024).

Behavioral Insights**:** Instead of merely focusing on the intellectual aspects of learning, a whole brain approach to education is needed to focus on the development of both intellectual and emotional intelligence (Kim, 2021). For educators, AI can analyze classroom interaction patterns to identify children who might be withdrawing or those who show early signs of neurodivergence, allowing for much earlier intervention.

➢ *Primary Education: Personalization and Mastery*

In primary school (ages 6–12), the focus shifts toward literacy, numeracy, and critical thinking. This is where Adaptive Learning Platforms become important and transformative. Emphasis is tailored in the role of providing adaptive learning experiences, aiding teachers in understanding student learning processes, and offering timely support whenever necessary. Due to continuous advancements in AI technologies, including learning, teaching, assessment, performance, engagement, and administration, AI's impact spans at various educational domains (Hairunnisa Ma'amor, Nur'ain Achim, Nor Lela Ahmad, Nabila Suraya Roszaman, Najwa Noor Kamarul Anuar,Nur Camelia Aqielah Khairul Azwa, Sahira Nabila Abd Rahman, Nur Ain Aqilah Hamjah, 2024)

*M*icro-Personalization*:* If a Child struggles with double-digit like trying to differentiate between 6 and 9, its subtraction but excels at addition, the AI adjusts the curriculum instantly. It doesn't move the whole class at the same speed; it ensures mastery before progression.

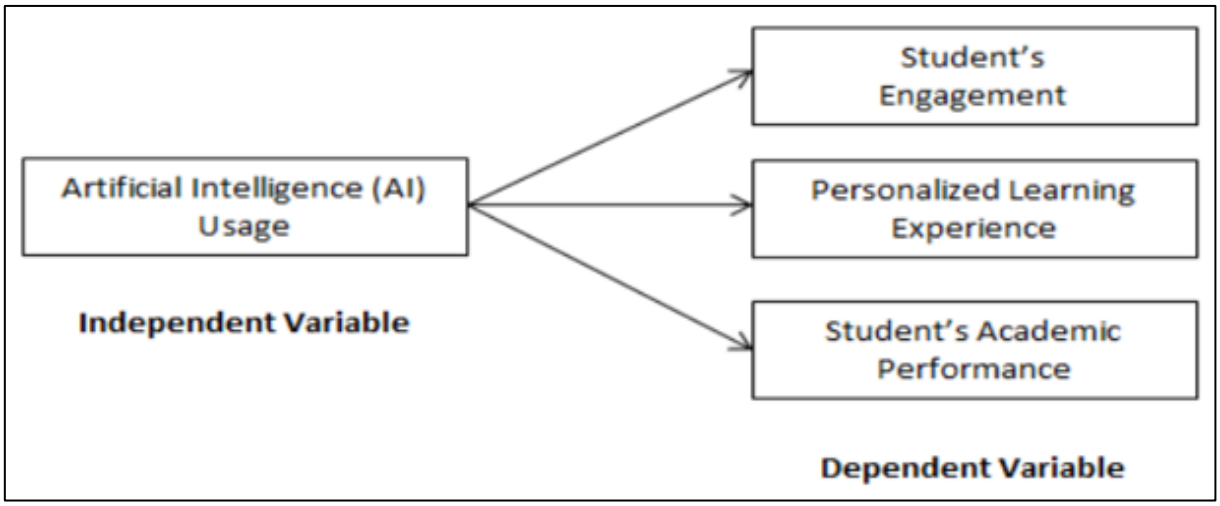


Fig 1 Hairunnisa, etal 2024

Automated Feedback Loops*:* AI assistants can provide immediate feedback on writing assignments—not just checking spelling, but suggesting ways to make a sentence more descriptive—allowing Children to iterate on their work before a teacher even sees the first draft.

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Gamified Learning: Modern platforms use AI to create dynamic quests where the "boss level" is a math problem or a reading comprehension test tailored to the Pupils' specific interests (e.g., space, animals, or sports).

➢ *The Teacher's Evolving Role*

AI is not a replacement for the educator; it is an administrative shield that allows teachers to return to the "human" side of teaching. AI-driven assessment platforms can be customized to reflect the content and cognitive expectations of Nigeria's existing curricular frameworks. For instance, adaptive testing tools dynamically adjust task complexity according to learner performance, thereby supporting mastery learning and curriculum coherence. Teachers, constrained by systemic challenges, often rely on conventional approaches that hinder the development of higher-order cognitive skills and comprehensive learner evaluation. (Ayo, 2025)

Administrative Relief**:** AI handles the "grunt work"—grading objective tests, tracking attendance, and generating progress reports, giving a relieve to the teacher

Pedagogical Assistance**:** AI can suggest lesson plan adjustments based on the previous day's performance data, highlighting which five Pupils in a class of thirty didn't grasp a specific concept. AI tools can support cognitive and social-emotional development in young learners AI tools, such as conversational agents, social robots, and intelligent tutoring systems, are being incorporated into learning activities and daily routines, thereby enhancing various aspects of children's development (Runke Huang, Yanan Bao, Yinkuo Wang and Jiameng Wei, 2024)

➢ *Critical Considerations and Ethics*

While the benefits are significant, the implementation requires a balanced approach: Similar research work conducted by (Runke Huang, etal 2024) identified the various tools such as: Conversational agents (CAs), Social robots, Educational games, Intelligent tutors, and AI projects—demonstrate that integrating AI technologies into existing preschool frameworks can significantly enhance the learning experience. However the universal usage of AI tools applications in early childhood education remains futuristic. In Nigeria, the following can be applied:

➢ *Ethical Considerations of A I Tools*

Table 1 Ethical Considerations of A I Tools

Grade Band	Focus Area	Concepts	Tools and Languages
Lower Primary (P1–3)	Computational Logic	Sequencing, Pattern Recognition, Decomposition.	Flashcards, Physical Games, ScratchJr.
Middle Primary (P4–5)	Block-Based Coding	Loops, Variables, Conditional Logic (If /rightarrow Then).	Scratch, mBlock, PictoBlox (AI extensions).
Upper Primary (P6)	AI Literacy & Data	Training Models, Ethics, Basic Python Syntax.	Teachable Machine, PictoBlox, Python (Intro`).

Nigeria's primary education system currently is undergoing its most significant structural transformation. AI education is seen as a driving factor for economic growth, the development of the future workforce, and global competitiveness (Jiahong Su a and Weipeng Yang, 2023) .The Federal Ministry of Education and the Nigerian Educational Research and Development Council (NERDC) have officially transitioned to a "functional and skills-heavy" model designed to align with the global digital economy.

➢ *The "Lighter Load, Stronger Minds" Policy*

The centerpiece of the 2026 update is a drastic reduction in subject volume to allow for deeper engagement with core competencies. This is working toward National Milestones and the 2030 Goalas cited by (Adenike A, Akinrotimi, TimililaJ Popoola,and IE,Udo, 2025) the adoption of AI in ECE is still in its nascent stages. While the National Artificial Intelligence Strategy (NITDA, 2024) and the National Digital Economy Policy and Strategy (2020-2030) signal the government's commitment to digital transformation, the current updates are part of a broader strategy to achieve 95% digital literacy by 2030.

- Subject Reduction: In Primary 1–3, the curriculum has been streamlined from 15 subjects down to 9 core subjects. Primary 4–6 has been reduced from 17 subjects to 11 or 12.
- Mandatory Digital Literacy: "Basic Digital Literacy" is now a compulsory core subject for all pupils starting in Primary 4. This isn't just about using computers; it covers data safety, the internet of things (IoT), and the ethical use of AI.
- Trade Skills Integration: Vocational subjects like Computer Hardware and GSM Repairs and Solar PV Installation have been introduced as early as upper primary to foster entrepreneurship from a young age.

➢ *How the Integrated AI Modules is to Work: The "Plugged" AI Integration (High-Tech)*

Using platforms like PictoBlox, students engage with:

- Computer Vision: Coding a "Smart Gate" that opens only when it recognizes a specific student's face.
- Natural Language Processing (NLP): Exploring Nigeria's indigenous LLMs (like M-ATLAS) to see how AI translates English into Hausa, Yoruba, or Igbo. These tools can assist children in the development of their language skills by suggesting alternative phrasing, providing examples in response to their queries, and

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offering contextual explanations as examined by Pendy 2023 in (Benebo-Solomon, Wilhelmina, 2024)
- Ethics and Bias: Lessons on why an AI might struggle to recognize local accents or names, teaching students to be critical of "foreign-built" models.
- Comparative Dimensions: Nigeria vs. Global Standards

When comparing Nigeria's path to AI adoption against global leaders (e.g., United State, China, Finland, Singapore, UAE, or Nordic models), the focus shifts from innovation to foundational adaptation to supports inclusivity, helps to detects learning disabilities early, and fosters global collaboration (Oke, 2025).

➢ *Comparasim of Nigerian Verses Global A I Tools Standard*

Table 2 Comparasim of Nigerian Verses Global A I Tools Standard

Feature	Global "AI-First" Systems	Nigeria's Emerging Paradigm
Infrastructure	Ubiquitous high-speed fiber/5G.	"Offline-first" and low-bandwidth AI models.
Content	Standardized digital curricula.	Multilingual (Hausa, Igbo, Yoruba) & culturally responsive AI.
Inclusivity	Narrowing digital/gender gaps.	Mitigating "double-marginalization" (rural + female).
Pedagogy	Student-centered "AI-partner" model.	Teacher-led "AI-assistant" (capacity-building) model.

➢ *The Nigerian "Adjustment" Framework*

The concept of "adjustment" in a multicultural society like Nigeria requires an AI strategy that respects the "Ubuntu" philosophy—centered on community, collective intelligence, and relational learning—rather than purely individualistic competition (George Chizoba Opara, Greg Eleh ,and Ezeamolue aloysius O, 2025).

- Linguistic Equity: AI must move beyond English-centric platforms to incorporate Nigeria's diverse linguistic landscape. Projects like *Nigeria Teacher AI* are exploring how to bridge these gaps by providing tools that support local pedagogical needs.
- Contextual Sustainability: Unlike Western models that focus on high-performance computing, the Nigerian paradigm focuses on sustainability through low-resource accessibility, utilizing offline-ready mobile applications to reach underserved regions (e.g., the North-East where conflict has disrupted traditional schooling).
- The Teacher as a Mediator: In Nigeria, AI is not replacing the teacher; it is being positioned as a tool for the Teachers Registration Council of Nigeria (TRCN) to upscale 1.5 million educators, shifting their role from rote lecturers to digital facilitators.

➢ *Challenges for Nigerian Reform*

A comparative analysis reveals that Nigeria's "paradigm shift" faces specific "systemic friction" that must be addressed to ensure sustainability:

- The Power-Connectivity Nexus: Unlike global peers, AI integration in Nigeria remains tethered to the availability of electricity and internet reliability. This necessitates a move toward Edge AI (AI that runs locally on devices without needing constant cloud connection).
- Policy Fragmentationt: While there is a national curriculum shift to include coding and robotics, institutional implementation is inconsistent. The gap between federal policy (e.g., NERDC/TRCN) and state-level execution creates a "dual education" reality.
- Cultural Resistance and Agency: There is valid skepticism regarding AI's potential to displace human decision-making. The Nigerian discourse highlights the importance of "Human-in-the-Loop" systems, ensuring that traditional communal values remain at the center of classroom culture.

II. RECOMMENDATIONS

➢ *Strategic Research Pathways*

This formal considers the suggestions for policy framework as it can focus on these three pillars:

- Localized Data Sets**:** How can we train AI models on Nigerian indigenous knowledge and cultural narratives to prevent the "digital colonization" of our educational content by other countries?
- Public-Private-Community Partnerships**:** How can the "Nigerian AI Teacher" model be scaled from a pilot to a universal standard, involving telecommunications and grassroots community leaders?
- Conflict-Sensitive Education**:** How can AI are deployed in regions like Borno, Adamawa, Yobe, etc to provide "education-in-emergencies" where traditional brick-and-mortar schools are inaccessible

III. CONCLUSION

Providing answers to these three major pillar-questions by our policy makers, our standard curriculum should be able to compete with other developed countries'. Hence the objectivity of these pillars can rally round the following assertions made to have a robust foundational AI education in the country: Pilot Testing and Capacity Building, Professional Development (TPD): Implement continuous, hands-on training for primary school teachers focusing on facilitation techniques, cross-curricular planning, and formative assessment. Above all, AI infrastructural development and supplies are essential.

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