

EFFECTS OF AI TOOLS ON TEACHING AND LEARNING IN NIGERIAN EDUCATIONAL INSTITUTIONS: A PHILOSOPHICAL PERSPECTIVE

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Abstract

Artificial Intelligence (AI) is increasingly becoming a transformative force in education globally, holding particular promise for the Nigerian educational sector, which faces persistent challenges such as over-crowding, under-resourcing, and inadequate teaching staff. This article critically examines the integration of AI technologies in Nigerian educational institutions through a philosophical lens, exploring its influence on teaching and learning processes. Drawing on educational philosophies such as constructivism, pragmatism, critical theory, and existentialism, it considers how AI tools are used to reshape knowledge construction, learner agency, and the teaching-learning practices. Nigerian case studies demonstrate AI's role in enhancing personalized learning, administrative efficiency, and access expansion. Yet, ethical concerns around equity, privacy, academic integrity, and cultural preservation are foregrounded. The article underscores the imperative for policies that balance technological innovation with Nigeria's socio-cultural values and humanistic educational traditions, ensuring AI amplifies educational quality without compromising foundational principles.

Keywords: Artificial intelligence, constructivism, pragmatism, teaching-learning, personalized learning

Introduction

The application of Artificial Intelligence (AI) in education signals potential increased transformation in how knowledge can be delivered, accessed, and internalized. Nigeria, with a growing youth population that confronts systemic educational deficits which consists of inadequate infrastructure, high student-teacher ratios, and unequal resource distribution stands at the cusp of an AI-driven educational revolution (Bali *et al.*, 2024; Sambo—Magaji *et al.*, 2025). Contemporary Nigerian initiatives employing AI-powered virtual tutoring have yielded remarkable gains. For example, World Bank-supported pilots in Abuja reflected accelerated literacy improvement by nearly two academic years within six weeks (World Bank, 2025). However, the integration of AI transcends mere technical efficiencies, which prompts profound philosophical inquiries like trying to know what it means to teach and learn

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in an AI-augmented environment. Can AI foster genuine intellectual growth, creativity, and human connection, or does it risk reductive, efficiency-driven education? These questions are accentuated within Nigeria's rich educational ethos, that is historically anchored in communal values, moral development, and holistic learning with templates that technology must respect and enhance (Nyaaba *et al.*, 2024; Afolabi, 2024).

This paper explores AI's complex influence on Nigerian education through a philosophical prism, weaving together theoretical frameworks and empirical insights. It advocates a nuanced approach that harmonizes AI's capabilities with Nigeria's cultural realities and ethical imperatives, ensuring that the human essence of education remains paramount.

Constructivism and Personalized Learning

Constructivism is primarily attributed to Jean Piaget, a Swiss psychologist who extensively studied cognitive development in the mid-20th century. It fundamentally redefined the understanding of how learners acquire knowledge. Piaget argued that learners are not blank slates that passively absorb information; rather, they actively construct their own knowledge by interacting with their environment and reflecting on their experiences. This process involves the continuous modification of cognitive structures, called schemas, by assimilating new information that fits into existing schemas and accommodation where schemas adapt to incorporate new information that challenges prior understanding. Piaget's developmental theory emphasized that knowledge is built gradually as the learner progresses through stages, with learning becoming effective when it is self-directed and experiential.

Key to constructivism is the belief in learner autonomy and active engagement. According to this philosophy, educators should create environments that support learners to explore, question, experiment and interact with the object of learning. This will help them to construct meaning uniquely based on their interactions. Social exchanges also enhance learning, as peers and teachers facilitate the refinement of

ideas. This theory supports a dynamic, personalized learning process that can assist individuals develop competence at different rates and through diverse pathways.

In the Nigerian context, constructivist principles find practical embodiment in AI technologies like adaptive learning platforms and intelligent tutoring systems. These AI tools dynamically adjust content difficulty and presentation style based on individual learners' performance. It effectively tailors instruction to their unique needs. For instance, in Nigerian Technical and Vocational Education and Training (TVET) institutions, learners who are exposed to AI-enhanced simulations improve engagement and skill acquisition. They repeatedly practice complex technical tasks until mastery is achieved and this parallels Piagetian cognitive development. This individual pacing is especially significant when considering Nigeria's often overcrowded classrooms, where teachers are faced the challenges of directing instruction to large numbers of students at the same time. AI therefore facilitates a personalized, constructivist learning environment that helps to nurture learner autonomy and deeper comprehension. Furthermore, multilingual AI content addresses Nigeria's linguistic diversity, allowing learners to revisit and fully understand challenging materials in accessible languages. In these ways, AI operationalizes constructivist tenets that harnesses technology to enhance meaningful and active learning within Nigeria's unique educational realities.

Pragmatism and Experiential Learning

The pragmatic philosophy of education, principally developed by American philosopher John Dewey in the early twentieth century, offers a compelling vision of learning as an active, contextualized, and experimental process. Dewey rejected abstract, rote learning detached from life. Instead, he asserted that education must engage learners in practical problem-solving and reflective inquiry grounded in real-world situations. For Dewey, knowledge acquisition is inextricably linked to experience. It is through doing, encountering consequences, and reflecting on actions that learners develop meaningful understanding. He further emphasized that

education should prepare individuals to participate in a democratic society by fostering collaboration, creativity, and adaptability.

Dewey's pragmatism centers on several core principles like learning through practice, which to transform reflective thinking experience into knowledge. Education therefore must connect with learners' interests and societal needs. Pragmatism also champions education's role in social reform, promoting environments that are democratically engaging or participatory, and responsive. In Nigerian education, the inadequate physical laboratory facilities and hands-on resources for science and technology represents a major constraint on Deweyan experiential learning. Here, AI-powered virtual laboratories and simulations serve as transformative tools. These technologies provide virtual environments where Nigerian students, including those in remote areas, can conduct chemistry experiments and manipulate mechanical components, or model ecological systems with real-time feedback. Research in Kano State indicates that students using AI-enabled Physics simulations demonstrate significantly better conceptual understanding and higher engagement compared to purely theoretical teaching. Such immersive and hands-on learning aligns perfectly with Dewey's pragmatism by merging theory with practice which encourages inquiry and reflection that are inaccessible in many under-resourced Nigerian classrooms.

Additionally, AI-driven project-based learning modules helps Nigerian learners to engage in collaborative problem-solving mechanisms that are focused on authentic community challenges, which helps to foster creativity and social responsibility. AI systems evaluate learners' decisions and promote interactive engagements that facilitate reflective learning processes. Consequently, AI embodies pragmatic educational ideals by transforming abstract school knowledge into practical skills and democratic learning experiences that are essential for Nigeria's socio-economic development.

Critical Theory: Equity, Power, and Digital Divide

Critical theory, grounded in the works of Theodor Adorno and Max Horkheimer of the Frankfurt School, challenges Nigerian learners to scrutinize <https://journals.unizik.edu.ng/jtese>

education and technology systems as embedded in broader power structures. The core of critical theory lies in exposing and resisting mechanisms through which dominant ideologies and socio-economic inequalities are reproduced. Within education, critical theory demands attention to know those whose knowledge is privileged and those whose voices are marginalized, advocating for emancipatory pedagogy that will empower the oppressed groups to recognize and transform inequalities to equity.

The essential tenets of critical theory include understanding education as influenced by societal power relations, promoting equity through critical pedagogy, and identifying technology as a site where disparities can be perpetuated or challenged. Critically, it wants to know who controls AI tools, how they shape knowledge and access, and what socio-political consequences unfold. In Nigeria, critical theory warnings resonate powerfully when analyzing AI's impacts. Nigeria's notorious urban-rural digital divide exemplifies the skewed distribution of technological benefits. Broadband penetration surpasses 50% in Lagos but falls below 10% in some remote northern areas (D'Haenens *et al.*, 2024). This disparity means AI educational advancements predominantly serve urban elites, risking the deepening of long-standing educational and socio-economic gap. AI deployment without addressing these infrastructural imbalance risks becoming a tool of exclusion rather than empowerment, reflecting the critical theorist concern about reinforcing domination.

Moreover, the foreign origins and datasets behind many AI systems have the danger of embedding cultural biases that obscure or devalue indigenous Nigerian knowledge, which further marginalizes local learners (Afolabi, 2024). The opacity of proprietary AI algorithms also challenges accountability. Nigerian scholars inspired by critical theory advocate for transparent AI development that should involve local stakeholders, prioritize inclusivity and decolonize educational contents. Collaborative initiatives to create African-centered AI datasets and open governance frameworks represent critical steps toward equitable AI education rooted in social justice. Therefore, critical theory equips Nigerian education stakeholders to pursue AI

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deployment that widens opportunity, challenges systemic inequalities, and respects cultural diversity.

Existentialism: Learner Agency and Authenticity

Existentialism, particularly as formulated by Jean-Paul Sartre and contemporaries in the mid-20th century, underscores the centrality of human freedom, choice, and authentic existence. Contrary to deterministic or mechanistic views of learning, existentialism views education as a process enabling individuals to discover their unique authentic selves through conscious decision-making and responsible action. Authentic learning involves confronting the anxiety of freedom and embracing the challenge of constructing personal meaning and identity amidst ambiguity. Key existentialist tenets distinguish education as a profound personal efforts characterized by freedom, responsibility, and the quest for meaningful engagement rather than surface-level knowledge grasp.

The increasing role of AI in Nigerian education directs serious existentialist concerns to the preservation of learner agency and authenticity. While AI can guide learning pathways and offer instant solutions, there is the danger of learners becoming intellectually passive consumers of machine-generated contents. Over reliance on AI threatens the development of critical judgment, creativity, and reflective thinking required for authentic knowledge construction (Schrage & Kiron, 2025). This risk is particularly significant in Nigeria, where traditional education values like mentor-student relationships, narrative learning, and dialogic interaction serve as vehicles for personal growth and ethical formation (Okebukola, 2025).

Existentialism advises Nigerian educators to integrate AI thoughtfully by ensuring learning environments that provoke questioning, critical discussions, and interpretative activities. Assignments encouraging students to critique AI answers, apply knowledge creatively, and engage in oral presentations can reinforce learner autonomy and authenticity. This balanced integration respects Nigeria's cultural heritage emphasizing community, dialogue, and moral development. In this way,

education supported by AI does not eclipse but augments the learner's freedom to shape knowledge and identity responsibly.

Practical Applications of AI in Nigerian Education

Artificial Intelligence is already making impacts in Nigerian classrooms and educational institutions by helping teachers, students, and administrators in practical ways. One of the most immediate benefits is in reducing the workload of teachers. In pilot programs in Lagos and Abuja, AI has been used to automate routine tasks such as grading exams, tracking attendance, and scheduling classes. These automated systems have sped up the time it takes to grade assignments and produce results. As a result, teachers in Nigerian schools have more time to spend mentoring their students personally and leading interactive discussions instead of being bogged down by paperwork (UNESCO, 2023; Novatia Consulting, 2024).

Another important use of AI is in intelligent tutoring systems that provide students with instant, personalized learning and feedback. These systems help learners better understand topics by adjusting the difficulty of questions in real time based on students responses. For example, a recent World Bank study found out that AI-supported virtual tutoring helped to improve English language skills notably among Nigerian secondary school students, with female students acknowledging substantial gains. This is particularly meaningful in Nigeria, where girls often face more educational barriers (World Bank, 2025). Additionally, AI-powered language tools help bridge Nigeria's many languages by offering translation and transcription services, making learning materials accessible to a wider group of students across different regions (Reuters, 2024).

AI is also helping fill infrastructural deficit, especially in Science, Technology, Engineering, and Mathematics (STEM) education. Many Nigerian schools lack well-equipped laboratories, which makes it difficult for students to participate in hands-on experiments. AI-powered virtual laboratories simulate these experiments digitally, which allows students to explore chemical reactions, physics experiments, or mechanical parts safely and interactively (Onatere-Ubrurhe & Ubrurhe, 2025; <https://journals.unizik.edu.ng/jtese>

Sambo—Magaji *et al.* 2025). These virtual laboratories are increasing students' engagement, encouraging creativity, and supporting Nigeria's wider goal of developing their technological workforce.

Systemic Impacts and Ethical Considerations

While the advantages of AI in education are clear, serious challenges remain, especially in the area of infrastructure and fairness. In Nigeria, only a small percentage of public primary schools (about 5.67%) have access to computers, compared to more than half of private schools (UNESCO, 2023). This uneven access has the implication of widening the gap between wealthy and poorer students if investments in infrastructure like electricity, internet connectivity, and devices are lacking (D'Haenens *et al.*, 2024). For AI to benefit all students, including those in rural and underserved areas, these infrastructural imbalance must be addressed.

Data privacy is another serious concern. AI systems in education often gather and analyze large volumes of students' information. Nigeria's Data Protection Act of 2023 sets important rules to protect this data, but weak enforcement has resulted in students being exposed to data misuse or exploitation, especially in schools with limited resources (DLA Piper, 2024; Afolabi, 2024). Moreover, many AI algorithms lack transparency, which raises the risk of hidden biases that could be unfair to some Nigerian learners. To prevent this, Nigeria needs clear regulatory frameworks that will ensure that AI tools are fair, accountable, and protective of students' privacy (Ngugi *et al.*, 2024).

AI also brings questions about academic integrity. The ability of AI to generate essays and solve problems is trying to undermine the authenticity of students' work. Nigerian universities have started to adopt new ways of assessment such as oral exams, project-based work, and in-class writing exercises to uphold academic honesty while still embracing AI's educational benefits (SyncSci AMLER, 2024). Educators are encouraging students to use AI as a learning assistant rather than a shortcut as it will help them to enhance their creative and independent thinking.

Lastly, preserving Nigeria's rich cultural identity is crucial as AI expands. Many off-the-shelf AI tools are based on Western educational models, which do not fit Nigeria's communal and oral learning traditions. Nigerian education leaders are working to localize AI by incorporating indigenous languages, community knowledge, and culturally relevant teaching methods into AI curricula and software development (Zembylas, 2024; Nyaaba *et al.*, 2024; Afolabi, 2024). This ensures that AI supports the country's educational values while advancing modernization.

Conclusion

AI's integration into Nigerian education has introduced substantial templates to personalizing learning experiences, streamlining administrative duties. It has also widened access, especially in contexts not initially contemplated. Its philosophical alignment with constructivist and pragmatist principles support learner-centered and practical education. Nonetheless, AI's deployment must be monitored with careful attention to ethical issues that have to do with equity, privacy, cultural preservation, and academic authenticity. Nigeria faces a decisive moment: embedding AI thoughtfully to enhance and not replace the unique human dimensions of education which requires balanced policy, infrastructure investments, ethical governance, and cultural localization. When embraced cautiously and contextually, AI can be a powerful tool in advancing Nigeria's educational goals and global competitiveness.

Recommendations

The integration of Artificial Intelligence into Nigerian education demands a careful balance between embracing innovation and safeguarding the ethical, cultural, and humanistic foundations of learning. Based on the challenges identified, these recommendations are made for policymakers, educators, and other stakeholders.

1. Efforts should be focused on localizing AI contents. Working closely with Nigerian educators, linguists, and technology experts are relevant in developing AI tools that reflect Nigeria's unique languages, cultures, and educational values. AI systems should support indigenous languages and culturally relevant

curricular to ensure that technology resonates with Nigerian learners and preserves cultural identity.

2. Pedagogy and teacher training must be revised. Nigerian teachers should receive comprehensive training in AI literacy paired with ethical and philosophical understanding.
3. Assessment methods need innovation. To maintain academic honesty in increasingly AI-enabled environments, diverse evaluation techniques such as creative projects, oral presentations, and collaborative work should be emphasized.
4. Establishment of ethical oversight is necessary. Nigerian educational institutions should create ethical review committees that are dedicated to monitoring AI applications.

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