



Artificial intelligence integration in Nigerian colleges of education: a descriptive document analysis of policy and curricular alignment

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KEY WORDS

Artificial intelligence,
Colleges of Education,
Policy Alignment,
Document Analysis

ABSTRACT

The integration of Artificial Intelligence (AI) in Nigerian education is driven by ambitious national policies, yet its implementation at the foundational teacher-training level remains obscure. This study adopted a descriptive document analysis design to evaluate the integration of AI into Nigerian Colleges of Education. The study specifically analyzed the National Artificial Intelligence Strategy (NAIS) and the Nigeria Certificate in Education (NCCE) Minimum Standards to identify prospects, challenges, and policy alignment. Anchored on the AI-Technological Pedagogical Content Knowledge (AI-TPACK) framework, a Document Analysis Protocol was used to extract and categorize textual data. The findings reveal a profound policy-curriculum misalignment. While the NAIS outlines robust macro-level prospects such as the 3 Million Technical Talent initiative and AI Centres of Excellence, the NCCE Minimum Standards remain anchored in 2012-era basic ICT, mandating analog technologies like video cassettes and overhead projectors. The study concludes that without an urgent revision of the NCCE curriculum to include AI-TPACK, Nigeria's vision of becoming a global AI leader will remain unachievable at the basic education level. The paper recommends an immediate overhaul of the EDU 212 curriculum and targeted infrastructure interventions for teacher-training institutions.

1. Introduction

Artificial Intelligence (AI) defined as the ability of digital computers or machines to mimic human intelligence and perform cognitive tasks such as thinking, learning, problem-solving and decision-making (Luwoye, Ahmed, Yusuf, & Abdulraheem, 2024) These has become a major driver of exponential technological change across the globe. The global advancement of technology influences ways of living in employment, health, and education, with AI rapidly shaping educational activities due to the ease and simplification it brings to learning processes (Eiriemiokhale, Oyedepo, & Sulyman, 2024).

In well-developed nations, AI is already an integral part of the educational sector, utilized to improve learning processes, optimize administrative tasks, and prepare students for increasingly technology-based job markets (Adesiji, 2024). Specifically, AI algorithms assist educators by generating quiz questions, creating lesson plans, and utilizing smart content delivery platforms to provide personalized education tailored to students' learning preferences and progress (Luwoye et al., 2024). Furthermore, the integration of AI into blended learning environments where traditional face-to-face instruction merges with technology provides flexibility for both instructors and students. It allows educators to employ a range of teaching techniques while freeing up time to connect directly with students and monitor their progress (Eiriemiokhale et al., 2024). Consequently, incorporating AI into curriculum development has become an essential component of educational systems worldwide (Adesiji, 2024).

In the Nigerian context, AI integration is driven by government initiatives such as the National Information Technology Development Agency (NITDA), which pressures institutions

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to modernize (Luwoye et al., 2024). However, this journey is fraught with obstacles, ranging from infrastructural limitations to negative effects like student over-dependence on AI tools, leading to intellectual laziness (Eiriemiokhale et al., 2024). Despite the surge in AI adoption in other sectors, it remains in its infancy within the educational sector, with only a few institutions actively partnering on AI projects (Oguguo et al., 2024). While universities are often the focus of these discourses, Colleges of Education (CoEs) which bear the critical responsibility of training the teachers who will implement these technologies at the foundational levels remain under-examined. Therefore, this paper adopts a descriptive document analysis to examine the policy and curricular alignment of AI integration in Nigerian CoEs.

Research Objectives

The specific objectives of this study are to:

1. Determine the prospects of AI integration as articulated in the national policy framework for the educational sector.
2. Examine the nature of technological and instructional provisions outlined in the current NCCE Minimum Standards for pre-service teachers?
3. Assess the extent of alignment between the national AI policy goals and the current minimum standards for teacher education (NCCE curriculum).

Research Questions

The following research questions guided the study:

1. What are the identified prospects and strategic benefits of AI for teacher education as outlined in the National Artificial Intelligence Policy?
2. What is the nature of technological and instructional provisions outlined in the current NCCE Minimum Standards for pre-service teachers?
3. To what extent do the current NCCE minimum standards reflect the technological knowledge (AI-TPACK) required to achieve the goals set out in the national AI policy?

Conceptual Framework

The AI-TPACK Lens

This study is anchored on the Technological Pedagogical Content Knowledge (TPACK) framework. Originally proposed by Mishra and Koehler (2006), TPACK posits that effective technology integration requires an intersection of three knowledge domains: Content, Pedagogy, and Technology (TK). However, as technologies evolved from passive tools to cognitive systems, the framework adapted. Ouyang and Jiao (2021) introduced AI-TPACK, arguing that AI possesses the capacity to make autonomous pedagogical decisions. Therefore, for pre-service teachers to effectively utilize AI, their Technological Knowledge must include an understanding of AI capabilities and ethical implications (Ouyang & Jiao, 2021). Applying this lens to policy documents allows this study to determine whether the NCCE curriculum explicitly contains the AI-focused TK required to actualize national technological ambitions, or if there is a disconnect.

Literature Review

Theme 1: Prospects of AI in Nigerian Education

A synthesis of recent studies reveals a strong consensus on the transformative prospects of AI in the Nigerian educational sector. Scholars predominantly highlight the potential for personalized and adaptive learning, where AI tailors content to individual student paces (Luwoye et al., 2024; Ibitoye et al., 2025). Beyond pedagogy, AI offers significant administrative and assessment efficiencies such as automating grading, streamlining admissions, and optimizing campus management (Adesiji, 2024; Oguguo et al., 2024). Furthermore, AI provides automated feedback and data-driven decision-making tools that can radically modernize classroom practices for pre-service teachers (Muhammad et al., 2025).

Theme 2: Challenges of AI Integration

Despite these prospects, literature consistently identifies severe systemic barriers. The most ubiquitous challenge is infrastructural deficit, with researchers pointing to inadequate digital infrastructure, unreliable power supply, and poor internet connectivity as fundamental bottlenecks (Adesiji, 2024; Sulyman et al., 2025). Closely tied to this is a shortage of skilled personnel; both educators and students often lack the technical competence to utilize AI effectively (Mahuta&Abubakar, 2025). Additionally, scholars highlight funding constraints and socio-technical challenges, including ethical concerns regarding data privacy and algorithmic bias (Alabi et al., 2025).

Theme 3: The Specific Gap

While much literature focuses on universities, targeted studies on CoEs reveal a critical tension. Empirical evidence shows that academics in Nigerian CoEs possess a high level of AI acceptability and are already adopting it for instructional planning (Olajuyigbe&Oziegbe, 2025). However, this bottom-up adoption is occurring in a policy vacuum. Agwom et al. (2025) found a significant relationship between AI integration and teacher education quality, explicitly recommending the inclusion of AI pedagogy in the NCE curriculum. This creates a paradox: lecturers are willing to use AI, but the overarching regulatory framework (NCCE) has not updated its minimum standards to formally guide or assess this integration.

Methodology

Research Design This study adopted a descriptive research design, specifically utilizing a descriptive document analysis approach. Bowley (2021) defines document analysis as a systematic procedure for reviewing or evaluating documents both printed and electronic. This design was deemed appropriate for the study because the research aimed to describe the current state of Artificial Intelligence integration as it exists within national policy frameworks and statutory curriculum guidelines, without manipulating any variables or relying on primary human responses.

Result

Research Question 1: What are the identified prospects of AI for teacher education as outlined in the NAIS?

Table 1: Descriptive Analysis of AI Prospects in the National AI Strategy (NAIS)

Strategic Focus Area	Specific Prospects/Initiatives Outlined in NAIS	Potential Relevance to Colleges of Education
Massive Talent Development	The "3 Million Technical Talent (3MTT)" initiative aimed at training a massive pool of digital talents; The Nigeria Artificial Intelligence Research Scheme (NAIRS) providing grants to 45 AI startups and researchers (p. 14).	While primarily tech-focused, this creates a potential pipeline of AI-literate graduates that Colleges of Education could recruit as specialized ICT lecturers.
Sectoral Transformation	Explicit goal to "enhance social development and inclusion by improving outcomes in sectors such as healthcare, agriculture and education" (p. 4). "Clear and actionable plans for AI adoption across critical sectors" (p. 5).	Directly identifies the education sector as a primary target for AI integration, implying that teacher training institutions are expected to be part of this transformation.
Institutional Hubs & Research	Establishment of "AI Centres of Excellence" to lead industry-specific solutions and train next-gen talent (p. 5). Specific mention of the "EduAI Hub" managed by the University of Lagos, aimed at advancing education through responsible AI (p. 14).	The "EduAI Hub" represents a direct prospect for educational AI research. CoEs could leverage these hubs for curriculum development and faculty training.
Ecosystem & Startup Growth	Fostering an "ecosystem of AI startups... successfully commercialising AI solutions" and driving innovation (p. 5).	A thriving AI startup ecosystem increases the likelihood of developing localized, AI-powered educational technologies (EdTech) tailored to the Nigerian basic education curriculum.

A descriptive analysis of the NAIS reveals a strong macro-level commitment to leveraging AI for national development. As presented in Table 1, the strategy identifies ambitious prospects like the 3MTT initiative and the "EduAI Hub." However, a critical reading indicates that the NAIS frames AI capacity building largely around producing tech developers and startups. It lacks specific, actionable directives on how these national prospects will be filtered down to upgrade the pedagogical capacity (AI-TPACK) of pre-service teachers within the CoE system.

Research Question 2: What is the nature of technological and instructional provisions outlined in the current NCCE Minimum Standards for pre-service teachers?

Table 2

Descriptive Analysis of Technological Provisions in the NCCE Minimum Standards (2012)

Area of Focus in NCCE Document	Specific Provisions Mandated in the Text	Indication of AI Readiness
Hardware & Infrastructure	Mandates "Computer equipment with printers," "Computer rooms," "Overhead projectors," "Video player/recorders," and "CCTV" in the Centre for Educational Technology (p. 22).	Low. Focuses heavily on traditional hardware and analog media storage (e.g., video cassettes, slides). No mention of cloud infrastructure or High-Performance Computing (HPC).
Software & Applications	Mentions "Computer-Assisted Instruction/Learning" (p. 17, 21) and basic "Softwares or Consumables" like diskettes and transparency pens (p. 22).	None. Limited to basic computer-assisted learning. Zero mention of Artificial Intelligence, Machine Learning algorithms, or adaptive learning software.
Curriculum Content (EDU 212)	Course outline includes "Photocopy and video production," "Graphic studio," and "Micro-teaching laboratory" (p. 21).	None. The content is focused on teachers <i>creating</i> basic media, not <i>interacting</i> with intelligent systems.
Technological Skills Required	Students are expected to "professionally combine use of conventional and ICT... strategies" (p. 10).	Low. "ICT" is treated as a generic tool, lacking the specific digital literacy required to navigate or integrate AI tools like ChatGPT or educational AI bots.

As detailed in Table 2, a descriptive analysis of the NCCE document reveals technological provisions fundamentally anchored in early 21st-century ICT, rather than modern AI readiness. The prescribed infrastructure heavily emphasizes traditional hardware like video cassette recorders, while the mandatory course EDU 212 focuses on "photocopy and video production." The document contains zero terminologies related to Artificial Intelligence or machine learning, indicating a structural challenge for integrating dynamic AI systems.

Research Question 3: To what extent do the current NCCE minimum standards align with the NAIS goals?

Table 3

Comparative Descriptive Analysis of NAIS Goals and NCCE Minimum Standards

Thematic Area	NAIS Vision/Goal (FMCIDE, 2025)	NCCE Minimum Standard Reality (NCCE, 2012)	Level of Alignment
Overarching Technological Vision	Aims for Nigeria to be a "global leader in AI" leveraging "local talent" and "innovation" (p. 4).	Aims to produce teachers who can combine "conventional teaching strategies and worlds' unfolding ICT" (p. 9).	Misaligned (Global AI leadership vs. Basic ICT appreciation)
Prescribed Curriculum Content	Focuses on building "AI skills across various sectors," establishing "AI Centres of Excellence," and funding AI research (p. 5, 14).	Mandates Course EDU 212 which focuses on "Photocopy and video production," "graphic studios," and basic "Computer-Assisted Instruction" (p. 21).	Misaligned (AI ecosystem building vs. Analog media production)
Infrastructure Requirements	Requires "Affordable high-performance computing (HPC)" and highlights the need for 25Mbps urban / 10Mbps rural broadband speeds (p. 5, 19).	Requires "Computer equipment with printers," "computer rooms," "overhead projectors," and "video cassettes" (p. 22).	Misaligned (Cloud/HPC infrastructure vs. Standalone hardware)
Expected Human Capital Outcome	Envisions an increase in "individuals with AI skills" and "next-gen AI talent" to drive the digital economy (p. 5).	Envisions producing teachers with "appropriate knowledge, skills and attitudes" for the basic education sub-sector (p. 9).	Partially Aligned (Both desire skilled citizens, but define "skill" at vastly different technological epochs).

A comparative descriptive analysis of the two documents indicates a profound policy-curriculum misalignment. The NAIS sets a vision for Nigeria to be a global leader in AI, leveraging local talent by 2030 (FMCIDE, 2025, p. 4). To achieve this in the education sector, the NAIS implies a need for an AI-literate workforce.

However, the NCCE Minimum Standards which dictate the knowledge base of every teacher entering the basic education system shows no alignment with this vision. For instance, under Course EDU 212 (Educational Technology: Theory and Practice), the prescribed content focuses on Photocopy and video production and graphic studios (NCCE, 2012, p. 21). There is a complete absence of AI-related technological knowledge (AI-TPACK). Therefore, while the NAIS strategizes for a high-tech future, the NCCE curriculum continues to prepare pre-service teachers for a low-tech present. This descriptive gap suggests that without an urgent revision of the NCCE minimum standards, the NAIS goals for the education sector will remain unachievable at the foundational level.

The findings of this document analysis reveal a stark disconnect between national policy aspirations and curricular reality. While the NAIS (2025) aims to build a robust AI ecosystem, the NCCE Minimum Standards (2012) remain anchored in basic ICT. This descriptive gap is not merely a theoretical concern; it has severe practical implications as evidenced by recent empirical studies. For instance, while Sulyman et al. (2025) found that lecturers in Colleges of Education are actively using AI to prepare lecture notes and assess students, they are doing so without institutional guidelines, leading to ethical concerns (Olajuyigbe&Oziegbe, 2025). Furthermore, Agwom et al. (2025) established statistically that AI improves teacher education, yet their study had to rely on individual capacity rather than a structured NCE curriculum. If the NCCE curriculum is not urgently revised to reflect the prospects identified by Luwoye et al. (2024) and Muhammad et al. (2025) such as personalized learning and automated feedback, the Colleges of Education will continue to train teachers who are technologically illiterate in the very tools their future students are already using.

Conclusion

This descriptive document analysis reveals a profound policy-curriculum misalignment in Nigeria. While the NAIS (2025) strategizes for a high-tech, AI-driven future, the NCCE curriculum continues to prepare pre-service teachers for a low-tech present, focusing on analog media. This gap has severe practical implications; as recent empirical studies show, CoE lecturers are already adopting AI individually, but without institutional guidelines or curriculum support, this leads to ethical concerns and unstructured practice (Olajuyigbe & Oziegbe, 2025; Agwom et al., 2025). The study concludes that without an urgent, targeted revision of the NCCE minimum standards to include AI-TPACK, Nigeria's vision of becoming a global AI leader will remain unachievable at the foundational classroom level.

Recommendations

1. **Urgent Revision of NCCE Minimum Standards:** The Federal Ministry of Education must immediately overhaul Course EDU 212 (Educational Technology) to transition from basic "Computer-Assisted Instruction" to "AI-Assisted Instruction," including modules on AI literacy and prompt engineering for educators.
2. **Institutionalization of AI-TPACK:** The NCCE should adopt the AI-TPACK framework as a benchmark for teacher readiness, ensuring technological knowledge in all NCE programs encompasses leveraging AI tools for content delivery.
3. **Targeted Infrastructure Intervention:** TETFund and NITDA must create a specific "AI in Teacher Education" intervention fund to build AI-compliant digital laboratories and provide reliable broadband in CoEs, rather than limiting these upgrades to universities.
4. **Mandatory Train-the-Trainer Programs:** The Ministry of Education, in collaboration with NCAIR, should organize nationwide AI capacity-building workshops for CoE lecturers, focusing on practical pedagogical applications.

5. Development of a Basic Education AI Ethics Policy: The NCCE and TRCN must co-develop a comprehensive "AI Ethics and Academic Integrity Policy" to preemptively address student over-reliance on AI and data privacy, ensuring AI is used as a pedagogical tool, not an academic shortcut.

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