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EVALUATION OF THE CHALLENGES AND PROSPECTS OF AI APPLICATION INTO NIGERIA COLLEGES OF EDUCATION VOCATIONAL EDUCATION PROGRAMME

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Abstract
This study evaluated the prospects and challenges of AI application in Nigerian Colleges of Education Vocational Education Programme . The research was guided by four research questions and adopted a descriptive survey design. The population comprised all academic staff from Colleges of Education across Nigeria. A sample size of 200 respondents were purposely selected. A structured questionnaire titled ″AI Adoption in Colleges of Education Questionnaire (AACOEQ)″ was used for data collection, validated by three experts in Educational Technology and Measurement & Evaluation, and tested for reliability using Cronbach's alpha (α = 0.78–0.84). Descriptive statistics (mean, standard deviation) were employed to analyze the data. Findings revealed minimal current AI integration (mean scores: 1.76–2.43), significant challenges such as poor internet connectivity (mean = 4.32) and funding gaps (mean = 4.18), yet strong optimism about AI's potential to enhance teaching (mean = 4.25) and research (mean = 4.12). Key strategies for improvement included government funding (mean = 4.41) and staff training (mean = 4.28). The study recommends urgent policy interventions, institutional partnerships, and curriculum reforms to accelerate AI adoption, ensuring Nigeria's teacher education system aligns with global technological advancements.

Keywords: AI, vocational education, colleges of education

Introduction

The rapid advancement of artificial intelligence (AI) has transformed various sectors globally, including education. AI-powered tools such as intelligent tutoring systems, automated grading, and personalized learning platforms have enhanced teaching efficiency, student engagement, and administrative processes in many developed nations (Holmes et al., 2019). However, in developing countries like Nigeria, the adoption of AI in education remains slow, particularly in Colleges of Education, which are pivotal in training future educators (Sanusi et al., 2022). While AI has been successfully integrated into universities and secondary schools in some regions (Mohammad & Mansour, 2020), Nigeria's teacher training institutions are yet to fully

embrace its potential, leaving a significant gap in modernizing the country's education system (Okpeseyi et al., 2024).

Globally, research has demonstrated the effectiveness of AI in improving learning outcomes. Studies by Mohammad and Mansour (2020) and Fokides and Mastrokoukou (2018) reveal that students exposed to AI-enhanced learning perform better than those taught through traditional methods. Similarly, UNESCO (2020) and Holmes et al. (2019) highlight AI's role in promoting inclusive and adaptive education. Despite these proven benefits, Nigerian Colleges of Education Vocational Education Programme continue to rely on conventional teaching approaches (Nwosu, 2019), limiting their ability to produce digitally competent teachers who can thrive in an AI-driven world (Alimi et al., 2021). This delay in AI adoption raises concerns about Nigeria's preparedness for future educational demands (UNESCO, 2020).

One major concern is the current extent of AI application in these institutions. While some may use basic digital tools, full-scale AI integration such as adaptive learning systems, AI-driven research tools, and automated administrative processes remains rare (Nwadinobi et al., 2024). Understanding the present level of AI adoption is crucial in identifying areas that require urgent intervention (Okpeseyi et al., 2024). This study examines how AI is currently being utilized (if at all) in Nigerian Colleges of Education Vocational Education Programme and assesses whether these institutions possess the necessary infrastructure and expertise to support AI-driven education (Adeniyi, 2024).

Another critical issue is the challenges hindering AI adoption. Factors such as poor internet connectivity, inadequate funding (Awofadeju et al., 2023), lack of AI-trained personnel (Akinola, 2024), and resistance to technological change (Mohammed & Shehu, 2023) may be major barriers. Additionally, curriculum limitations and policy gaps could further restrict AI integration (Pasupuleti et al., 2024). By identifying these obstacles, this research provides insights into the systemic problems that must be addressed to facilitate AI adoption in Nigeria's teacher training institutions (Thuraka et al., 2024b).

Despite these challenges, there are significant prospects for AI application in Nigerian Colleges of Education Vocational Education Programme . AI can revolutionize teacher training by providing virtual simulations, real-time feedback mechanisms (Jain & Jain, 2019), and data-driven instructional strategies (Nwosu et al., 2024). It can also enhance research capabilities through AI-powered data analysis tools and improve institutional management via automated administrative systems (Pasupuleti et al., 2024b). Exploring these opportunities will help stakeholders understand how AI can transform Nigeria's teacher education system for greater efficiency and global competitiveness.

To ensure successful AI integration, strategies for improvement must be developed. Learning from successful AI adoption models in other countries could also provide a roadmap for Nigerian institutions. This study explores actionable strategies to accelerate AI implementation in Colleges of Education, ensuring they remain relevant in the digital age.

The significance of this research lies in its potential to influence policy and practice. By highlighting both the challenges and opportunities of AI adoption, the study provides a foundation for policymakers, educators, and technology experts to collaborate in advancing AI integration in Nigeria's education sector. Furthermore, it contributes to academic discourse on AI in teacher training, offering empirical data that can guide future research and innovation.

Ultimately, this study aligns with global efforts to modernize education through technology. As AI continues to reshape learning worldwide (UNESCO, 2020), Nigeria must not be left behind. By addressing the gaps in AI adoption within Colleges of Education, this research aims to foster a more technologically advanced, efficient, and future-ready teacher training system in Nigeria. The findings will serve as a valuable resource for stakeholders committed to leveraging AI for educational development.

Research Questions

1. To what extent is AI currently applied into Nigeria Colleges of Education Vocational Education Programme Vocational Education?
2. What extent are the challenges of AI application into Nigerian Colleges of Education Vocational Education Programme Vocational Education?
3. What are the prospects of AI application into Nigerian Colleges of Education Vocational Education Programme Vocational Education?
4. What are the strategies for improving AI application in Nigeria Colleges of Education Vocational Education Programme Vocational Education?

Research Method

This study employed a descriptive survey research design to evaluate the challenges and prospects of AI application in Nigerian Colleges of Education Vocational Education Programme Vocational Education programme. The descriptive survey approach was chosen because it allows for the systematic collection and analysis of data to describe existing conditions, trends, and perceptions within a specific population. The study targeted vocational education academic staff in Colleges of Education, as this group is directly involved in curriculum delivery and institutional management. A total of 200 respondents were purposively selected to ensure representation from institutions with varying levels of technological infrastructure. Data were collected using a structured questionnaire titled **"**AI Adoption in Colleges of Education Questionnaire" (AACOEQ), which was divided into four sections aligned with the research questions: current AI application, challenges of AI adoption, prospects of AI integration, and strategies for improvement. Responses were measured using a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), to capture the respondents' perceptions and experiences. To ensure the validity of the instrument, the questionnaire was reviewed by three experts in Educational Technology and Measurement & Evaluation from the Faculty of Education at a Nigerian university. Their feedback

helped refine the clarity, relevance, and comprehensiveness of the items. The instrument was administered to 30 respondents from institutions not included in the main study was conducted to establish reliability. Cronbach's alpha coefficients for the pilot test yielded scores of 0.81 for the challenges section, 0.84 for the prospects section, and 0.79 for the strategies section, indicating strong internal consistency. The researcher, with the assistance of trained field assistants, administered the questionnaires, achieving a 90% response rate with 180 completed and returned out of 200 distributed. Descriptive statistics, including mean and standard deviation, were used to answer the research questions. The benchmark for interpretation was set as follows: a mean score of 3.50 or above indicated high agreement or acceptance, 2.50 to 3.49 represented moderate agreement, and below 2.50 signified low agreement.

Results

To what extent is AI currently applied into Nigeria Colleges of Education Vocational Education Programme Vocational Education?

Table 1: Current Application of AI in Nigerian Colleges of Education Vocational Education Programme

S/N	Item	Mean	SD	Remark
1	AI tools (e.g., chatbots, adaptive learning platforms) are currently used in my institution for teaching and learning.	2.15	1.02	Low Extent
2	My institution employs AI-driven systems for administrative tasks (e.g., grading, admissions, scheduling).	1.89	0.97	Low Extent
3	AI-powered research tools (e.g., data analysis software, plagiarism checkers) are accessible to staff and students.	2.43	1.11	Low Extent
4	Training programs on AI applications are available for staff in my institution.	1.76	0.85	Low Extent
5	Students in my institution are encouraged to use AI for learning and assignments.	2.37	1.08	Low Extent

The findings reveal a concerningly low level of AI application across Nigerian Colleges of Education Vocational Education Programme programme. With all mean scores falling below the 2.50 benchmark (range: 1.76-2.43), none of the measured aspects of AI integration reached even moderate levels of implementation. The lowest scoring item was the availability of training programs (Mean = 1.76, SD = 0.85), indicating a severe deficiency in capacity building for AI adoption. This suggests most institutions lack structured initiatives to prepare staff for technological transitions. Administrative applications of AI showed particularly weak penetration (Mean = 1.89, SD = 0.97), revealing that critical functions like grading and scheduling remain largely manual processes. While research tools showed relatively higher adoption (Mean = 2.43, SD = 1.11), this still represents minimal implementation, likely limited to basic plagiarism checkers rather than advanced AI analytics. The moderate standard deviations across items (range:

0.85-1.11) suggest some variability between institutions, but with all means in the "Low Extent" range, no institution appears to have achieved comprehensive AI integration.

Table 2: Challenges of AI Adoption in Nigerian Colleges of Education Vocational Education Programme

S/N	Item	Mean	SD	Remark
1	Poor internet connectivity hinders AI adoption in my institution.	4.32	0.76	Very High Extent
2	Lack of funding limits the procurement of AI tools and infrastructure.	4.18	0.82	High Extent
3	There is a shortage of staff trained to use or teach AI technologies.	3.95	0.89	High Extent
4	Resistance to technological change among staff/students slows AI integration.	3.67	0.93	High Extent
5	The curriculum does not adequately incorporate AI-related skills.	3.54	0.97	High Extent
6	Government policies do not support AI adoption in Colleges of Education.	3.81	0.85	High Extent

The study reveals several critical barriers impeding the successful application of artificial intelligence in Nigerian Colleges of Education Vocational Education Programme . Analysis of the data shows that infrastructure limitations constitute the most severe challenge, with poor internet connectivity emerging as the foremost obstacle (Mean = 4.32). This finding aligns with broader technological challenges in Nigeria's education sector, where unreliable power supply and inadequate digital infrastructure frequently hinder technological adoption. The high standard deviation (SD = 0.76) suggests some variation between institutions, likely reflecting disparities between urban and rural locations or between better-funded and under-resourced colleges. Financial constraints present another major challenge, as evidenced by the high mean score for lack of funding (Mean = 4.18). This finding corroborates existing literature on resource limitations in Nigerian higher education. The relatively lower standard deviation (SD = 0.82) indicates consistent funding challenges across most institutions. Human capacity gaps compound these structural challenges, with a pronounced shortage of AI-trained staff (Mean = 3.95) creating a significant bottleneck for implementation efforts. The moderately high standard deviation (SD = 0.89) suggests some institutions may have begun addressing this through staff development initiatives, though most remain severely constrained.

Resistance to technological change among stakeholders (Mean = 3.67) emerges as a notable cultural and behavioral barrier. This resistance likely stems from multiple factors including technophobia, lack of awareness about AI's benefits, and concerns about job displacement. The curriculum's failure to incorporate AI competencies (Mean = 3.54) represents a systemic weakness

that perpetuates these challenges, creating a cycle where neither educators nor students develop necessary digital skills. Policy deficiencies (Mean = 3.81) complete this picture of institutional barriers, indicating that national frameworks for AI adoption in teacher education remain underdeveloped or poorly implemented.

What are the prospects of AI application into Nigerian Colleges of Education Vocational Education Programme?

Table 3: Prospects of AI Integration in Nigerian Colleges of Education Vocational Education Programme

S/N	Item	Mean	SD	Remark
1	AI can improve teaching efficiency through personalized learning.	4.25	0.68	High Agreement
2	AI-powered tools can enhance research productivity in my institution.	4.12	0.72	High Agreement
3	AI can reduce administrative workload (e.g., automated grading, record-keeping).	3.98	0.75	High Agreement
4	AI adoption will better prepare teachers for 21st-century classrooms.	4.05	0.71	High Agreement
5	My institution is willing to invest in AI technologies in the next 5 years.	3.56	0.83	High Agreement

The results reveal a strong consensus among respondents regarding the promising potential of AI integration in Nigerian Colleges of Education Vocational Education Programme . All measured aspects of AI prospects received mean scores above 3.50, indicating high levels of agreement about its benefits. The highest-rated prospect was AI's ability to enhance teaching efficiency through personalized learning (Mean=4.25), demonstrating educators' recognition of how adaptive technologies could transform instructional delivery to better meet individual student needs. Closely following were perceptions about AI's capacity to improve research productivity (Mean=4.12) and better prepare teachers for modern classrooms (Mean=4.05), suggesting widespread acknowledgment of AI's role in advancing both academic rigor and professional development.

Administrative applications of AI also garnered strong support, with respondents agreeing that automation could significantly reduce workload burdens (Mean=3.98). This reflects practical expectations about AI's ability to streamline time-consuming tasks like grading and record-keeping. While slightly more modest, the positive perception about institutional willingness to invest in AI technologies (Mean=3.56) still indicates foundational support for future adoption, despite current implementation challenges. The relatively higher standard deviation (SD=0.83) for this item suggests some variability in confidence levels across institutions, likely influenced by differing financial capacities or leadership priorities.

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What are the strategies for improving AI application in Nigeria Colleges of Education Vocational Education Programme ?

Table 4: Strategies for Improving AI Application in Nigerian Colleges of Education Vocational Education Programme

S/N	Item	Mean	SD	Remark
1	Partnering with tech firms can facilitate AI adoption in my institution.	4.32	0.65	High Agreement
2	Regular training workshops on AI should be organized for staff and students.	4.28	0.61	High Agreement
3	Government should increase funding for AI infrastructure in Colleges of Education.	4.41	0.58	High Agreement
4	AI-related courses should be integrated into the teacher-training curriculum.	4.15	0.72	High Agreement
5	Institutions should collaborate with universities abroad for AI knowledge transfer.	3.87	0.81	High Agreement

Analysis of the improvement strategies reveals unanimous strong endorsement from respondents, with all proposed approaches scoring well above the 3.50 threshold for high agreement. The most strongly supported strategy was increased government funding for AI infrastructure (Mean=4.41), reflecting the acute awareness of financial constraints as a primary barrier to technological advancement. This was closely followed by advocacy for institutional partnerships with technology companies (Mean=4.32) and implementation of regular training workshops (Mean=4.28), demonstrating stakeholders' recognition of the need for both resource acquisition and capacity building.

Curriculum integration of AI-related courses received robust support (Mean=4.15), indicating a growing consensus about the necessity of embedding digital competencies into teacher education programs. While still strongly agreed upon, international collaborations for knowledge transfer showed slightly more variability in responses (Mean=3.87, SD=0.81), possibly reflecting differing levels of institutional capacity to establish and maintain such partnerships. The consistently high mean scores across all strategies suggest a clear roadmap for AI integration, with stakeholders emphasizing multi-pronged approaches that combine financial investment, industry collaboration, human capital development, and curriculum modernization. The narrow standard deviations (ranging from 0.58 to 0.81) indicate remarkable consensus among respondents about these improvement strategies, regardless of their institutional affiliations or positions.

Discussion of Findings

The current state of AI application in Nigerian Colleges of Education Vocational Education Programme presents a complex paradox that demands careful examination through multiple lenses

- technological, pedagogical, institutional, and socio-economic. The abysmally low adoption levels (with means ranging from 1.76 to 2.43 across all indicators) reflect systemic failures that extend beyond simple resource constraints. From a technological diffusion perspective, these findings exemplify what Rogers' Innovation Theory would classify as a near-total failure in the adoption process, where AI technologies have barely moved beyond the knowledge stage in most institutions. The particularly dismal performance in staff training programs (Mean=1.76) suggests a critical breakdown in the persuasion and decision stages of innovation adoption, where potential users would normally develop positive attitudes toward the technology. This aligns with but intensifies the findings of Nwosu (2019), whose earlier study warned about Nigeria's sluggish response to educational technology trends, though the current data reveals an even more concerning stagnation than previously documented.

The institutional analysis reveals deeper structural issues that explain these findings. Colleges of Education in Nigeria operate within what institutional theorists would describe as a "ceremonial conformity" paradigm - maintaining traditional educational models while paying lip service to technological innovation. The slightly better but still inadequate performance in research tool accessibility (Mean=2.43) supports this interpretation, as it reflects institutions responding to external accountability pressures (research output demands) while neglecting core pedagogical transformation. This finding both confirms and challenges Sanusi et al.'s (2022) optimistic projections about technology adoption in Nigerian teacher education - while some digital tools have been acquired, they remain peripheral rather than transformative. The administrative systems' particularly poor showing (Mean=1.89) exemplifies what systems theory identifies as institutional inertia, where bureaucratic structures resist changes that might disrupt established power dynamics and workflows. The findings mirror the broader Nigerian educational ecosystem's chronic underfunding, but with important nuances. While Adeniyi (2024) correctly identifies funding as a primary barrier, the current study reveals that even basic, low-cost AI applications (like automated grading systems or adaptive learning platforms) remain largely absent, suggesting that financial constraints alone cannot fully explain the adoption gap. This discrepancy points to what might be termed "technological capability poverty" - a composite deficit encompassing not just hardware and software, but more crucially, the human expertise, organizational structures, and strategic vision needed to harness these tools. The moderate standard deviations (0.85-1.11) indicate some inter-institutional variation, likely reflecting the emerging digital divide between urban institutions with better connectivity and access to tech-savvy staff versus rural colleges facing compounded disadvantages.

These findings gain deeper significance when contrasted with international benchmarks. While Mohammad and Mansour's (2020) study documented successful AI integration in Middle Eastern teacher colleges, and UNESCO's (2020) reports highlighted African success stories in countries like Kenya and South Africa, Nigeria's Colleges of Education appear stuck in what might be called "pre-digital" approaches to teacher training. This divergence supports Akinola's (2024)

contention about Nigeria's unique technological adoption challenges, but extends it by demonstrating how these barriers manifest specifically in teacher education. The near-total absence of AI in core teaching functions (Mean=2.15) contradicts global trends where even developing countries have leveraged basic AI tools to enhance instruction, suggesting Nigeria's case represents not just delayed adoption but potentially a qualitatively different adoption trajectory.

The challenges hindering AI adoption in Nigerian Colleges of Education Vocational Education Programme constitute a complex web of infrastructural, human capital, institutional, and policy barriers that collectively create what might be termed a "perfect storm" of technological stagnation. The data reveals a striking consistency in the severity of these challenges, with all identified barriers scoring between 3.54 and 4.32 on the agreement scale, indicating their pervasive and systemic nature. The foremost challenge of poor internet connectivity (Mean=4.32) exemplifies the fundamental infrastructure deficit that plagues Nigeria's educational institutions, a finding that aligns precisely with Awofadeju et al.'s (2023) diagnosis of digital infrastructure as the primary bottleneck for educational technology adoption. However, this study extends previous research by quantifying just how severely this limitation impacts AI-specific applications, where stable high-bandwidth connections are often prerequisites for most cloud-based AI tools. The remarkably low standard deviation (SD=0.76) suggests near-universal consensus on this barrier across institutions, whether urban or rural, underscoring its status as a national rather than localized challenge.

Financial constraints (Mean=4.18) emerge as another critical barrier, but with important nuances that go beyond simple underfunding narratives. While Adeniyi and Okusi's (2024) work highlighted general funding shortages in African education systems, the current findings reveal how this specifically cripples AI adoption through multiple pathways: inability to procure commercial AI solutions, lack of maintenance budgets for existing technologies, and insufficient funds for staff training. The slightly higher standard deviation (SD=0.82) compared to internet connectivity suggests some institutions may have found partial workarounds through alternative funding sources, though none appear to have overcome this challenge completely. This finding both confirms and complicates Bellei's (2019) argument about cost-effective AI solutions for developing countries, as it demonstrates that even supposedly affordable options remain out of reach for chronically underfunded teacher training institutions.

Human resource limitations present another layered challenge, with the shortage of AI-trained staff (Mean=3.95) reflecting deeper systemic issues in Nigeria's teacher education pipeline. This finding strongly supports Akinola's (2024) identification of skills gaps as critical adoption barriers, but adds the crucial dimension of institutional capacity - many Colleges of Education lack not just individual experts but entire support systems for technology integration. The resistance to technological change (Mean=3.67) compounds this human capital challenge, revealing a cultural dimension that Pasupuleti et al. (2024) similarly identified in their cross-cultural study of educational technology adoption. This resistance likely stems from multiple sources: fear of job

displacement, discomfort with new technologies, and lack of incentives for adopting innovative practices - factors that create what innovation theorists call "implementation resistance" even when technologies are available.

Curriculum deficiencies (Mean=3.54) and policy gaps (Mean=3.81) represent particularly insidious barriers because they create self-perpetuating cycles of technological marginalization. The curriculum's failure to incorporate AI competencies means new teachers enter the workforce without digital skills, perpetuating traditional teaching methods. This finding directly contradicts UNESCO's (2020) recommendations for 21st-century teacher education and explains why Nigerian classrooms remain largely untouched by the global AI education revolution. The policy gap is equally troubling, as it reflects a lack of coordinated national strategy for educational technology integration, leaving individual institutions to navigate complex technological landscapes without guidance or support. These findings collectively paint a picture of an educational subsystem trapped in multiple Catch-22 situations: institutions can't adopt AI without trained staff, but can't train staff without AI resources; curricula won't change without policy direction, but policies remain undeveloped without institutional demand. The infrastructure and funding barriers mirror those identified by Thuraka et al. (2024b) in other developing nations, suggesting common constraints across the Global South. However, the particularly acute human capital challenges and policy vacuums appear more pronounced in Nigeria's case, supporting Okpeseyi et al.'s (2024) comparative findings about Nigeria's lag behind peer nations in educational technology adoption. The resistance to change also appears more entrenched than in similar studies from Asia and Latin America, possibly reflecting Nigeria's particular sociocultural dynamics around education and technology.

These challenges represent not just obstacles to technological adoption but fundamental threats to the relevance of Nigeria's teacher education system. In an era where AI literacy is becoming as fundamental as traditional literacy for educators, the persistence of these barriers risks producing generations of teachers ill-equipped for modern classrooms. The findings suggest that overcoming these challenges will require more than incremental improvements - it demands a fundamental reimagining of teacher education that positions technological integration as central rather than peripheral to institutional missions. This aligns with but intensifies Holmes et al.'s (2019) call for radical transformation in teacher education, suggesting that for Nigerian institutions, the need is even more urgent given their starting point further behind the technological curve.

The overwhelmingly positive prospects for AI integration in Nigerian Colleges of Education Vocational Education Programme (with mean scores ranging from 3.56 to 4.25) reveal a fascinating paradox - while current adoption remains minimal, stakeholders demonstrate remarkable optimism about AI's transformative potential. This enthusiasm, particularly strong regarding teaching efficiency (Mean=4.25) and research enhancement (Mean=4.12), suggests Nigerian educators have moved beyond technological skepticism to recognize AI's pedagogical

value, aligning with but surpassing Jain and Jain's (2019) predictions about developing nations' readiness for educational AI. The high agreement on AI's administrative benefits (Mean=3.98) reflects growing awareness that automation could solve chronic inefficiencies in Nigerian higher education, supporting Nwadinobi et al.'s (2024) findings about AI's potential to streamline African academic institutions' operations. However, the slightly lower but still positive score for institutional willingness to invest (Mean=3.56) reveals pragmatic caution - while conceptually supportive, stakeholders recognize the financial and infrastructural realities constraining rapid adoption, a nuance often missing from more optimistic international projections like those in UNESCO's (2020) reports.

The strong consensus on AI's role in preparing future teachers (Mean=4.05) carries particular significance, indicating that Nigerian educators view AI not as a threat but as an essential component of modern teacher training. This finding challenges common narratives about developing world resistance to educational technology and instead supports Ayanwale et al.'s (2022) emerging research showing Nigerian teachers' increasing openness to technology integration. The narrow standard deviations (ranging from 0.68 to 0.83) across all prospect items demonstrate unusual unanimity among respondents, suggesting this optimism transcends institutional boundaries and position levels - a finding that contrasts with more divided attitudes documented in Mohammad and Mansour's (2020) Middle Eastern study. This consensus may reflect Nigeria's unique position as a technology-adopting (rather than inventing) nation, where educators can observe AI's benefits in early-adopter countries without experiencing its growing pains directly.

The prospects data becomes particularly compelling when analyzed through the lens of innovation diffusion theory. Nigerian Colleges of Education Vocational Education Programme appear to have skipped the typical "skepticism" phase of technology adoption, moving directly from unawareness to enthusiastic anticipation - a phenomenon Huang's (2021) work on technology adoption patterns might classify as "leapfrogging readiness." This optimism persists despite the documented implementation challenges, suggesting that Nigerian educators have cognitively decoupled AI's potential benefits from current adoption barriers, viewing the former as inevitable and the latter as temporary. Such dichotomous thinking explains why the same respondents can simultaneously report minimal current use yet strong future expectations, a finding that adds complexity to Venkatesh et al.'s (2003) unified technology acceptance models. These findings suggest Colleges of Education may become unexpected leaders in AI integration. The strong research enhancement prospects (Mean=4.12) particularly indicate that faculty see AI as a potential equalizer that could boost their institutions' academic output and prestige - a motivation that aligns with global patterns but carries special urgency in Nigeria's competitive higher education environment. The teaching efficiency prospects (Mean=4.25) similarly reflect Nigerian educators' pragmatic recognition that AI could help address chronic challenges like large class

sizes and limited resources, providing solutions that Fokides and Mastrokoukou's (2018) research has shown effective in other resource-constrained contexts.

These prospect findings gain additional significance when contrasted with the challenges data. The coexistence of high optimism and significant barriers creates what might be termed "aspirational readiness" - a state where institutional actors are psychologically prepared for transformation but lack the means to achieve it. This contrasts with both developed nations' "implementational readiness" and less developed regions' "resistant stasis," positioning Nigerian Colleges of Education Vocational Education Programme in a unique transitional space that Nwosu et al. (2024) have identified as characteristic of nations on the cusp of educational technology breakthroughs. The consistency of these prospect ratings across institution types and geographical locations suggests this readiness represents a national rather than localized phenomenon, providing a strong foundation for coordinated national policy interventions.

These findings suggest Nigeria's teacher education sector has crossed a critical psychological threshold for AI acceptance, meaning the primary barriers are now practical rather than attitudinal. This creates a window of opportunity for strategic investments and partnerships that could rapidly accelerate adoption, particularly in areas like personalized learning and research support where enthusiasm is highest. The findings also imply that any AI integration initiatives will likely meet less cultural resistance than typically expected in developing contexts, allowing policymakers to focus on solving tangible infrastructure and training challenges rather than overcoming ideological opposition. This optimistic yet grounded perspective positions Nigerian Colleges of Education Vocational Education Programme as potentially fertile ground for targeted AI pilot programs that, if successful, could provide models for other developing nations facing similar adoption challenges.

The strategies proposed for improving AI application in Nigerian Colleges of Education Vocational Education Programme reveal a sophisticated understanding of the multidimensional interventions required for meaningful technological transformation, with all strategic approaches receiving exceptionally strong endorsement (means ranging from 3.87 to 4.41). The overwhelming consensus on government funding as the foremost strategy (Mean=4.41) reflects a pragmatic recognition that without substantial public investment, other improvement efforts will remain partial and unsustainable - a finding that powerfully validates Adeniyi's (2024) arguments about the necessity of state-led financing for educational technology in developing contexts. The remarkably low standard deviation (SD=0.58) on this item demonstrates unprecedented unanimity among Nigerian educators about the government's pivotal role, suggesting a collective realization that piecemeal, institution-level solutions cannot overcome systemic infrastructure deficits. This finding challenges the growing neoliberal discourse in educational technology literature that emphasizes private sector solutions, instead supporting Thuraka et al.'s (2024b) contention that in resource-constrained environments, only coordinated public investment can create the foundation for sustainable technology integration.

The strong advocacy for industry partnerships (Mean=4.32) and international collaborations (Mean=3.87) presents an interesting strategic duality - while respondents clearly see value in both domestic and global knowledge transfers, the significantly stronger preference for local tech firm partnerships suggests a pragmatic desire for solutions grounded in Nigerian technological realities rather than imported models. This finding aligns with but extends Pasupuleti et al.'s (2024) research on successful educational technology partnerships in Africa by demonstrating Nigerian educators' specific preference for context-sensitive collaborations over generic international programs. The slightly lower but still robust support for foreign university ties (Mean=3.87) likely reflects awareness of successful models like the African Digital Schools Initiative while acknowledging the challenges of sustaining such cross-border relationships - a nuance that adds depth to Okpeseyi et al.'s (2024) comparative studies of international educational technology transfer.

The overwhelming emphasis on training workshops (Mean=4.28) as a key strategy reveals critical professional development gaps that current pre-service and in-service teacher education programs fail to address. This finding powerfully corroborates Akinola's (2024) identification of skills shortages as the most solvable barrier to AI adoption, while providing empirical evidence that Nigerian educators themselves prioritize continuous learning over one-time technology procurements. The strong endorsement of curriculum integration (Mean=4.15) further demonstrates stakeholders' recognition that AI competencies must become institutionalized rather than treated as optional add-ons - a perspective that resonates with but goes beyond Sanusi et al.'s (2022) recommendations for gradual technology incorporation in teacher education. Together, these two strategies present a comprehensive human capital development approach combining immediate upskilling with long-term systemic change, reflecting what Huang (2021) might term a "scaffolded" strategy for technological capacity building.

What makes these strategic preferences particularly noteworthy is their alignment with global best practices while remaining grounded in Nigerian realities. The emphasis on government leadership echoes successful models from countries like Rwanda and Estonia that treated educational technology as national priorities, while the focus on local partnerships reflects lessons from Kenya's edtech ecosystem development. However, the Nigerian context adds unique dimensions - the extraordinary consensus on funding needs highlights the severity of resource constraints, while the balanced approach to partnerships demonstrates awareness of both the opportunities and limitations of international cooperation in Africa's largest economy. These findings collectively suggest that Nigerian educators have developed what might be called "contextually sophisticated" perspectives on AI integration strategies - understanding global models but adapting them to local constraints and opportunities.

The strategic framework emerging from these findings presents a rare example of what implementation science would classify as "coherent" reform planning - where proposed interventions align closely with identified challenges and desired outcomes. The funding and

infrastructure strategies directly address the documented resource constraints; the training and curriculum proposals target the skills gaps; and the partnership approaches seek to overcome institutional isolation. This coherence contrasts sharply with the fragmented technology integration efforts critiqued in Nwosu's (2019) earlier work, suggesting Nigerian educators have developed more systemic thinking about educational technology reform. The findings particularly challenge policymakers to move beyond symbolic, isolated interventions toward comprehensive, mutually reinforcing strategies that address all dimensions of the AI adoption ecosystem simultaneously.

These strategy preferences reveal an emerging vision for AI integration that is both ambitious and pragmatic - recognizing the transformative potential of these technologies while acknowledging the sustained, multifaceted effort required to realize that potential. The strong strategic consensus across institutions of varying sizes and resource levels suggests Nigeria's teacher education sector may be reaching what innovation theorists call a "tipping point" where sufficient conceptual alignment exists to enable coordinated national action. This creates an unprecedented opportunity for the Federal Ministry of Education to lead a structured, well-resourced AI integration initiative that could position Nigerian Colleges of Education Vocational Education Programme as regional leaders in educational technology innovation - provided the strategies are implemented with the same coherence and comprehensiveness with which they have been envisioned by the sector's practitioners.

Conclusion

This study reveals a critical paradox in Nigerian Colleges of Education Vocational Education Programme : while stakeholders recognize the transformative potential of AI in teacher training, systemic barriers—such as poor infrastructure, funding shortages, skills gaps, and policy deficiencies—hinder meaningful adoption. Despite low current AI integration, strong optimism exists about its prospects, particularly in enhancing teaching efficiency, research productivity, and administrative workflows. The findings underscore the urgent need for coordinated, multi-stakeholder interventions to bridge the gap between aspiration and implementation, ensuring Nigeria’s teacher education system remains relevant in an increasingly AI-driven global education landscape.

Recommendations

1. Nigerian Government (Ministry of Education & TETFund) should Allocate dedicated funding for AI infrastructure (e.g., high-speed internet, cloud-based tools) in Colleges of Education and establish a national policy framework for AI integration in teacher training.
2. College Administrators should Partner with local tech firms to pilot cost-effective AI solutions (e.g., adaptive learning platforms) and prioritize mandatory AI training workshops for staff to build digital competencies.
3. Curriculum Developers (NCCE & NUC) should Revise teacher-training curricula to embed AI literacy and pedagogy, ensuring graduates are equipped to leverage AI tools in 21st-century classrooms.

4. International Development Partners (UNESCO, World Bank) should Facilitate knowledge-transfer programs between Nigerian institutions and global universities with successful AI integration models, focusing on scalable, context-sensitive solutions.

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