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ENHANCING ENTREPRENEURSHIP EDUCATION IN NIGERIA THROUGH ARTIFICIAL INTELLIGENCE: OPPORTUNITIES AND ETHICAL CHALLENGES

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ABSTRACT

Nigerian tertiary institutions, including Ahmadu Bello University, face significant challenges in integrating Artificial Intelligence (AI) into entrepreneurship education, resulting in outdated curricula that fail to foster entrepreneurial mindsets or equip students with the skills needed for innovation. The rapid advancement of digital technologies presents a transformative opportunity to enhance entrepreneurship education, but AI integration is hindered by ethical concerns, infrastructural limitations, and digital illiteracy. Despite AI's potential to enable personalized learning, business simulations, and data-driven decision-making, traditional education systems struggle to adapt, leading to a gap between theoretical business instruction and practical, innovation-driven learning. This study explores how AI can improve entrepreneurship education in Nigeria by addressing these barriers while examining concerns such as algorithmic bias, privacy issues, and over-reliance on automation, which could marginalize certain student populations and reduce the role of human agency in teaching. The research employs a qualitative desk-based methodology, drawing on institutional reports, and policy documents to assess both the opportunities and challenges of AI integration in Nigerian higher education. The study is framed by the Technology Acceptance Model (TAM) and Human Capital Theory, providing insights into the factors influencing AI adoption and its potential for developing human skills. The findings highlight the need for curriculum reform, educator training, and ethical AI deployment to create inclusive and future-ready entrepreneurship education. The study concludes with strategic recommendations for policy-makers, EdTech developers, and educational institutions to ensure AI is effectively integrated to foster entrepreneurial innovation and enhance the overall learning experience in Nigeria's tertiary institutions.

Keywords*: Artificial Intelligence (AI), Entrepreneurship Education, Personalized Learning, Business Simulations, and Data-Driven Decision-Making Support*

1. Introduction

In the face of a rapidly evolving global economy, entrepreneurship education has become a critical pillar for national development, especially in developing countries like Nigeria. With the increasing demand for job creators over job seekers, Nigerian tertiary institutions are under pressure to revamp their teaching strategies to produce graduates with entrepreneurial mindsets and digital competencies (Abubakar et al., 2025; Afolabi, 2025). However, conventional models of entrepreneurship instruction in Nigeria have often been criticized for being overly theoretical, lacking experiential learning, and failing to equip students with real-world business decision-making skills (Babatunde et al., 2021).

Artificial Intelligence (AI) is increasingly being recognized as a transformative force in education, with the potential to revolutionize how entrepreneurship is taught, assessed, and experienced (Ghosh et al., 2023; OECD, 2021). AI technologies such as intelligent tutoring systems, adaptive business simulations, virtual mentors, and data-driven feedback mechanisms offer promising ways to tailor learning to individual student needs, foster innovation, and simulate real-life entrepreneurial challenges (UNESCO, 2023; Yakubu, 2024). These applications enable students to experiment with entrepreneurial decisions in risk-free digital environments, thereby bridging the gap between theory and practice and enhancing entrepreneurial intentions a trend consistent with findings in entrepreneurship education research in Nigeria (Ayo-Sobowale, 2021). Furthermore, integrating AI into entrepreneurship learning aligns with broader curriculum development reforms advocated in Nigerian adult and non-formal education systems, emphasizing digital readiness, learner autonomy, and real-time analytics to drive competency acquisition (Hassan, 2025; Obiako, 2024).

In Nigeria, recent studies have begun to explore the integration of AI in edupreneurship defined as the intersection of education and entrepreneurial innovation (Abubakar et al., 2025; Asiyanbola et al., 2025). These studies emphasize the role of AI in transforming not just what is taught, but how it is taught and learned. However, the adoption of AI in Nigerian entrepreneurship education is still at a nascent stage and is beset by multiple barriers. These include infrastructural limitations, insufficient faculty training, resistance to innovation, and inadequate curriculum alignment with digital trends (David, 2025; Olupayimo & Edeh, 2025). Many conventional universities in Nigeria continue to offer business-related courses without embedding entrepreneurial practice, creativity, and digital innovation into their curriculum, thereby limiting students' capacity to become job creators (Babatunde et al., 2021; Olupayimo & Edeh, 2025).

Even in institutions like Ahmadu Bello University, entrepreneurship is often approached as a general course with minimal experiential learning components (Abubakar et al., 2025; Afolabi, 2025). As a result, students graduate with business knowledge but lack the entrepreneurial mindset, problem-solving capabilities, and startup-readiness necessary for navigating Nigeria’s volatile job market and driving self-employment initiatives.

Ahmadu Bello University, being one of Nigeria’s oldest and most prestigious institutions, reflects this broader trend. Although the university has made efforts to incorporate entrepreneurship as a general studies course (GST), it is often treated as an auxiliary subject with limited practical engagement,

mentorship, or integration with digital tools. Critical components such as ideation labs, venture incubation, business simulations, and startup funding guidance are largely absent or underdeveloped. This gap undermines the institution's potential to produce job creators rather than job seekers and calls for a systematic overhaul of how entrepreneurship is embedded across faculties not merely as a policy requirement, but as a transformational component of university education.

Furthermore, ethical considerations remain a pressing concern in the integration of AI into entrepreneurship education. Issues such as algorithmic bias, unequal access to AI tools, lack of data governance, privacy risks, and diminished human agency in teaching and assessment processes pose significant risks (Ghosh et al., 2023; UNESCO, 2023). Without appropriate regulatory frameworks and ethical guidelines, the deployment of AI could exacerbate existing inequalities rather than bridge them, particularly in contexts where digital infrastructure is weak or unevenly distributed (Obiako, 2024; OECD, 2021). In Nigeria, the absence of a national AI policy heightens these risks, as universities rely on fragmented institutional policies that fail to address ethical oversight, data protection, or accountability mechanisms (Uriri & Mmom, 2025). Shittu et al. (2024) further highlight the urgent need for ethical governance structures to ensure that AI deployment does not reinforce socio-economic disparities or institutional biases. Taken together, these issues emphasize the necessity of a comprehensive ethical and regulatory framework to guide AI adoption in entrepreneurship education.

In light of these developments and challenges, this study seeks to critically explore the dual dimensions of opportunity and ethical concern in using AI to enhance entrepreneurship education in Nigeria. It aims to offer practical solutions for policymakers, educators, and technologists to ensure inclusive, ethical, and context-relevant adoption of AI in Nigerian tertiary institutions.

In line with the above the following objectives are stressed;

1. To examine the role of Artificial Intelligence in enhancing the delivery, assessment, and experiential learning components of entrepreneurship education in Nigeria.
2. To identify the ethical, infrastructural, and pedagogical challenges associated with integrating AI into entrepreneurship curricula in Nigerian tertiary institutions.
3. To propose context-specific and actionable policy recommendations for the ethical and inclusive deployment of AI tools in entrepreneurship education.

2. Literature Review

The integration of Artificial Intelligence (AI) into entrepreneurship education has attracted significant scholarly attention, particularly in the context of enhancing personalized learning, fostering creativity, and preparing students for a digital economy. Chen et al. (2024), in a comprehensive scoping review, identified several AI applications such as intelligent feedback systems, adaptive learning environments, and business simulations that have proven effective in supporting entrepreneurial learning outcomes in both developed and emerging economies. These tools allow learners to engage in experiential activities that mirror real-world entrepreneurial decisions, thereby increasing their

cognitive engagement and practical skill acquisition. This aligns with broader global evidence from OECD (2021) and UNESCO (2023), which emphasize AI's capacity to promote learner-centered instruction and empower students through data-driven personalization. Within the Nigerian context, studies by Yakubu (2024) and Obiako (2024) highlight how AI-enhanced learning systems can strengthen student engagement, collaboration, and innovation when integrated into entrepreneurship and business education. Similarly, Hassan (2025) argues that AI-enabled curriculum development can support flexible pedagogies and interactive learning designs that foster entrepreneurial competencies essential for Nigeria's evolving digital economy.

In the Nigerian context, Abubakar et al. (2025) argue that AI-driven edupreneurship represents a critical pathway for modernizing tertiary education. Their study at Nigerian universities highlighted AI's potential to support curriculum innovation, remote learning facilitation, and access to business mentorship tools. Similarly, Asiyanbola et al. (2025) observed that while educators show growing awareness of AI tools, actual adoption remains limited due to infrastructural gaps and insufficient professional development. These findings underscore the need for institutional support and training to fully harness AI's potential.

Scholars such as Afolabi (2025) and Jim et al. (2025) have emphasized the transformative role of AI in developing entrepreneurial mindsets among students in higher education. Their research illustrates how AI can enable early exposure to digital business environments and help students build skills in opportunity recognition, risk assessment, and innovation. However, David (2025) and Olupayimo & Edeh (2025) warn that without a well-structured integration framework, AI may simply replicate the limitations of traditional instruction failing to support inclusivity or ethical learning.

Ethical considerations also feature prominently in the literature. Onyejegbu (2023) and Shittu et al. (2024) highlight concerns about algorithmic bias, data privacy, and loss of human agency. Their studies advocate for the development of regulatory guidelines and ethics-focused teacher training to safeguard the educational process from unintended harm. In addition, Ejeh & Igbokwe (2025) point to the need for ethical algorithms in AI tools to support responsible decision-making among learners, especially in fields like entrepreneurship where moral reasoning and social responsibility are critical.

The literature provides a balanced view AI holds immense potential to revolutionize entrepreneurship education in Nigeria, but this potential can only be realized through strategic, ethical, and inclusive implementation.

2.1 Conceptual Clarifications

The conceptual clarification section provides a foundational understanding of the key terms and ideas central to this study. It defines Artificial Intelligence in the context of education, explores the scope and importance of entrepreneurship education, and examines the intersection between human decision-making and AI-enhanced skill acquisition.

Definition of Artificial Intelligence in the Context of Education

Artificial Intelligence (AI) in education refers to the application of machine-based systems capable of performing tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, and adapting to new inputs. In educational settings, AI encompasses tools such as intelligent tutoring systems, adaptive learning platforms, predictive analytics, natural language processing, and AI-powered chatbots (Chen et al., 2024). These tools can tailor instruction to individual learning styles, automate assessment, and provide real-time feedback, thus enhancing both teaching efficiency and learner engagement. In the Nigerian context, AI has begun to influence edupreneurship through innovations that support customized teaching and scalable business training modules (Abubakar et al., 2025; Bali et al., 2024).

Entrepreneurship Education: Scope and Importance in National Development

Entrepreneurship education involves structured learning processes aimed at developing individuals' skills, mindsets, and knowledge necessary to identify business opportunities, take initiative, and manage risk to create economic value (Babatunde et al., 2021). In Nigeria, this form of education is vital for addressing youth unemployment and underemployment, as highlighted in the National Bureau of Statistics (NBS, 2023) report, which underscores the urgency of equipping young people with entrepreneurial competencies. Beyond job creation, entrepreneurship education contributes to inclusive economic development by empowering individuals from diverse socio-economic backgrounds to participate in enterprise and drive grassroots innovation (Olupayimo & Edeh, 2025; Ayo-Sobowale, 2021).

Emerging scholarship further argues that integrating digital and AI-enhanced pedagogies into entrepreneurship education can significantly strengthen national capacity for innovation, creativity, and resilience particularly in economies experiencing rapid technological change (Obiako, 2024; Hassan, 2025). When effectively delivered, entrepreneurship education becomes a critical pathway for fostering self-reliance, reducing dependency on formal employment, and building adaptive skills essential for navigating economic uncertainty in Nigeria's evolving digital landscape (Yakubu, 2024).

Human Decision-Making in Learning Environments

Human decision-making in education refers to the cognitive, emotional, and behavioral processes educators and learners use to make judgments about teaching, learning, assessment, and self-regulation. In entrepreneurship education, this encompasses the ability to evaluate business risks, make financial decisions, innovate under uncertainty, and adapt to changing market conditions skills that rely heavily on human reasoning, creativity, and experiential learning (Ayo-Sobowale, 2021). Traditional classroom settings emphasize human intuition, reflective thinking, and peer collaboration; however, the rise of AI introduces algorithmic assistance in decision-making, providing predictive insights, automated feedback, and data-driven recommendations that can support or sometimes override human judgment (Ghosh et al., 2023; Ejeh & Igbokwe, 2025).

This shift raises important pedagogical and ethical considerations. UNESCO (2023) stresses that balancing AI automation with human critical thinking is essential to preserve learner autonomy, creativity, and ethical reasoning key pillars of entrepreneurial success. Similarly, scholars argue that

over-reliance on AI-driven decision tools may dilute students' capacity for independent analysis and moral judgment, making it crucial to design AI-supported entrepreneurship programs that augment rather than replace human agency (Onyejegbu, 2023; OECD, 2021).

Link Between AI Capabilities and Entrepreneurial Skill Acquisition

AI offers dynamic opportunities for entrepreneurial skill acquisition through immersive and data-driven learning experiences. For instance, business simulations powered by AI allow students to make real-time strategic decisions and receive adaptive feedback, effectively mimicking real-world entrepreneurial scenarios (Kangiwa et al., 2024). Beyond simulations, AI supports the development of key entrepreneurial competencies such as problem-solving, market analysis, customer engagement, and financial forecasting skills increasingly essential in a technology-driven business environment (Yakubu, 2024).

Through predictive analytics and personalized learning algorithms, AI can help learners identify strengths and areas for improvement, thereby supporting individualized pathways for building entrepreneurial mindsets (Afolabi, 2025; Jim et al., 2025). Global frameworks, including OECD (2021) and UNESCO (2023), emphasize that such AI-assisted learning becomes most effective when embedded within human mentorship structures, ethical oversight, and culturally relevant pedagogies. When aligned with contextual realities in Nigeria and complemented by instructor guidance, these AI-driven approaches can significantly enhance entrepreneurial readiness and better prepare students for participation in a rapidly evolving digital economy (Obiako, 2024; Hassan, 2025).

2.2 Opportunities of AI in Entrepreneurship Education

Artificial Intelligence presents numerous opportunities to transform the landscape of entrepreneurship education in Nigeria. One of the most prominent is personalized learning, where AI adapts content and pacing based on the individual student's strengths, weaknesses, and learning style. This is particularly valuable in entrepreneurship, where learners may require different approaches to develop financial literacy, strategic thinking, and innovation skills (Chen et al., 2024; Afolabi, 2025).

Another significant opportunity lies in AI-powered business simulations. These platforms replicate real-world scenarios where students must make decisions on product development, marketing, and financial management. Such experiential learning environments foster critical thinking and resilience, allowing students to fail safely and learn iteratively key qualities of successful entrepreneurs (Kangiwa et al., 2024; Jim et al., 2025).

Intelligent tutoring systems also offer value, providing immediate feedback and support outside traditional classroom hours. These systems can help learners build entrepreneurial skills at their own pace while allowing instructors to monitor progress and intervene where necessary (Abubakar et al., 2025; David, 2025).

Additionally, predictive analytics can be used to track students' entrepreneurial development, assess readiness for startup incubation, and identify which learners may need targeted interventions. This

data-driven approach enhances the efficiency of entrepreneurship education programs and supports evidence-based decision-making by institutions (Olupayimo & Edeh, 2025).

Finally, AI-enabled content creation tools can support students in developing business plans, conducting market research, and simulating customer engagement strategies thereby enhancing their digital fluency and practical business readiness (Olatunde-Aiyedun et al., 2024; Asiyanbola et al., 2025).

2.3. Ethical and Contextual Challenges in Integrating AI into Entrepreneurship Education

While the integration of Artificial Intelligence (AI) into entrepreneurship education presents transformative opportunities, it also introduces a host of ethical and contextual challenges that must be addressed to ensure equitable and responsible deployment in the Nigerian educational system.

Algorithmic Bias and Exclusion

One of the most critical ethical concerns is algorithmic bias. AI systems are only as objective as the data on which they are trained. If datasets are incomplete or skewed by socio-economic, gender, or regional disparities, the AI tools may reinforce these inequalities by favoring certain groups of students over others (Shittu et al., 2024; Onyejegbu, 2023). In entrepreneurship education, where fairness, inclusion, and opportunity identification are core, such biases can undermine learner confidence and restrict access to support systems.

Data Privacy and Security

Another major issue is data privacy and digital surveillance. AI platforms often require large volumes of student data to personalize learning and generate insights. In the absence of comprehensive data protection policies in many Nigerian institutions, the misuse of student information poses serious risks to privacy and institutional accountability (Edu & Uwelegbewe, 2025; David, 2025). Additionally, the commercial use of student-generated entrepreneurial ideas or profiles without consent may breach ethical standards.

Digital Divide and Infrastructure Deficits

The digital divide in Nigeria exacerbates the uneven adoption of AI. Many rural and underfunded institutions lack reliable internet, electricity, or modern devices necessary for AI integration (Bali et al., 2024; Uriri & Mmom, 2025). This technological gap not only limits access to AI-enhanced learning environments but also marginalizes students who are already at a socio-economic disadvantage. Without strategic infrastructure investment, AI may deepen existing inequalities rather than reduce them.

Teacher Readiness and Professional Development Gaps

Educators themselves face significant challenges in adopting AI tools. Studies have shown that many teachers lack the training or confidence to effectively use AI in their classrooms (Asiyanbola et al., 2025; Abubakar et al., 2025). This lack of readiness can lead to misuse or underutilization of AI,

diminishing its impact on entrepreneurship education. Moreover, some teachers perceive AI as a threat to their professional autonomy, especially when AI systems begin to replace human judgment in content delivery or assessment.

Over-Automation and Loss of Human Judgment

There is a growing concern that over-reliance on AI may result in the erosion of human-centered learning, particularly in fields like entrepreneurship where emotional intelligence, ethical reasoning, and creativity are essential (Ejeh & Igbokwe, 2025). When critical decisions such as opportunity evaluation or venture strategy are outsourced to algorithms, students may become passive recipients rather than active problem-solvers. This threatens the very spirit of entrepreneurial education, which thrives on risk-taking, intuition, and personal engagement.

In sum, while AI can significantly enhance entrepreneurship education in Nigeria, ethical and contextual concerns must be addressed through well-developed guidelines, inclusive policies, and capacity-building initiatives. Without these safeguards, the use of AI may inadvertently amplify systemic inequities rather than solve them.

2.4 Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM) and the Human Capital Theory. The TAM, developed by Davis (1989), explains how users come to accept and use a new technology based on perceived usefulness and perceived ease of use both of which are critical in understanding educators' and students' readiness to adopt AI in learning. On the other hand, the Human Capital Theory posits that education and skill acquisition increase individuals' productivity and economic value, thereby supporting the idea that entrepreneurship education when enhanced through AI can significantly boost entrepreneurial capacity and national development. Together, these theories provide a dual lens for assessing both technological adoption and the broader economic rationale for integrating AI in entrepreneurship education.

3. Methodology

This study adopts a qualitative, desk-based research design that relies exclusively on secondary data sources. The choice of this approach is appropriate because the study aims to analyse existing evidence on the opportunities and ethical challenges of integrating Artificial Intelligence (AI) into entrepreneurship education in Nigeria rather than collect primary empirical data. Accordingly, the research draws on a systematic review of peer-reviewed journal articles, books, institutional reports, policy documents, and conference papers published within the last ten years.

A structured document analysis protocol was employed to guide the selection and evaluation of materials. Relevant publications were identified using academic databases such as Google Scholar, ResearchGate, and Scopus with keywords including "Artificial Intelligence," "entrepreneurship education," "Nigeria," "AI ethics," and "digital learning technologies." Documents were then screened based on relevance, conceptual clarity, and direct applicability to Nigerian higher education. Policy documents including the National Universities Commission (NUC) Benchmark Minimum Academic

Standards (BMAS), Nigeria's National Digital Economy Policy and Strategy (NDEPS), and institutional digital-learning frameworks—were also reviewed to assess the regulatory and institutional readiness for AI-enhanced entrepreneurship education.

Data analysis followed a thematic content analysis approach. Reviewed materials were coded into key themes such as AI-driven pedagogy, curriculum gaps, infrastructural readiness, ethical risks, and opportunities for entrepreneurial skill enhancement. This allowed for the identification of recurring patterns, emerging trends, and country-specific challenges. Although the study references examples from conventional universities such as Ahmadu Bello University (ABU), these do not constitute empirical case studies but serve only as contextual illustrations of typical structural and pedagogical conditions in Nigerian tertiary institutions.

4. The Nigerian Context: Systemic Barriers to AI Integration in Entrepreneurship Education

Despite the growing awareness of Artificial Intelligence (AI) and its educational applications, Nigeria faces significant systemic barriers that hinder the effective integration of AI into entrepreneurship education. These challenges stem from infrastructural, institutional, policy, and cultural limitations within the tertiary education landscape.

4.1 Infrastructural Deficiency and Unequal Access

Many Nigerian higher institutions, especially in rural or public sectors, struggle with inadequate digital infrastructure including unreliable electricity, poor internet connectivity, and outdated computer labs (Bali et al., 2024; Edu & Uwelegbewe, 2025). These deficiencies restrict access to AI-powered platforms, particularly among students in under-resourced environments. As a result, only a minority of elite or private institutions can experiment with AI in entrepreneurial training, leading to digital exclusion and regional disparities.

4.2 Policy Gaps and Regulatory Uncertainty

The absence of a national AI-in-education policy in Nigeria has left institutions without a coherent framework for adoption, ethics, or integration. While countries like Kenya and Rwanda have developed AI strategies aligned with education, Nigeria still lacks a centralized roadmap for incorporating AI into the curriculum, especially in specialized areas like entrepreneurship (Onyejegbu, 2023; Ogunbodede & Atchrim, 2025). Without government policy direction, universities are left to navigate this technological shift independently and inconsistently.

4.3 Curriculum Rigidity and Misalignment

Entrepreneurship curricula in many Nigerian universities remain rigid and outdated, focusing largely on theoretical concepts with little integration of digital tools or AI-based learning methodologies (Olupayimo & Edeh, 2025; Babatunde et al., 2021). This misalignment between curriculum content and 21st-century entrepreneurial demands creates a gap between student expectations and institutional delivery. Furthermore, there is limited collaboration between curriculum developers and AI or EdTech experts, stalling innovation.

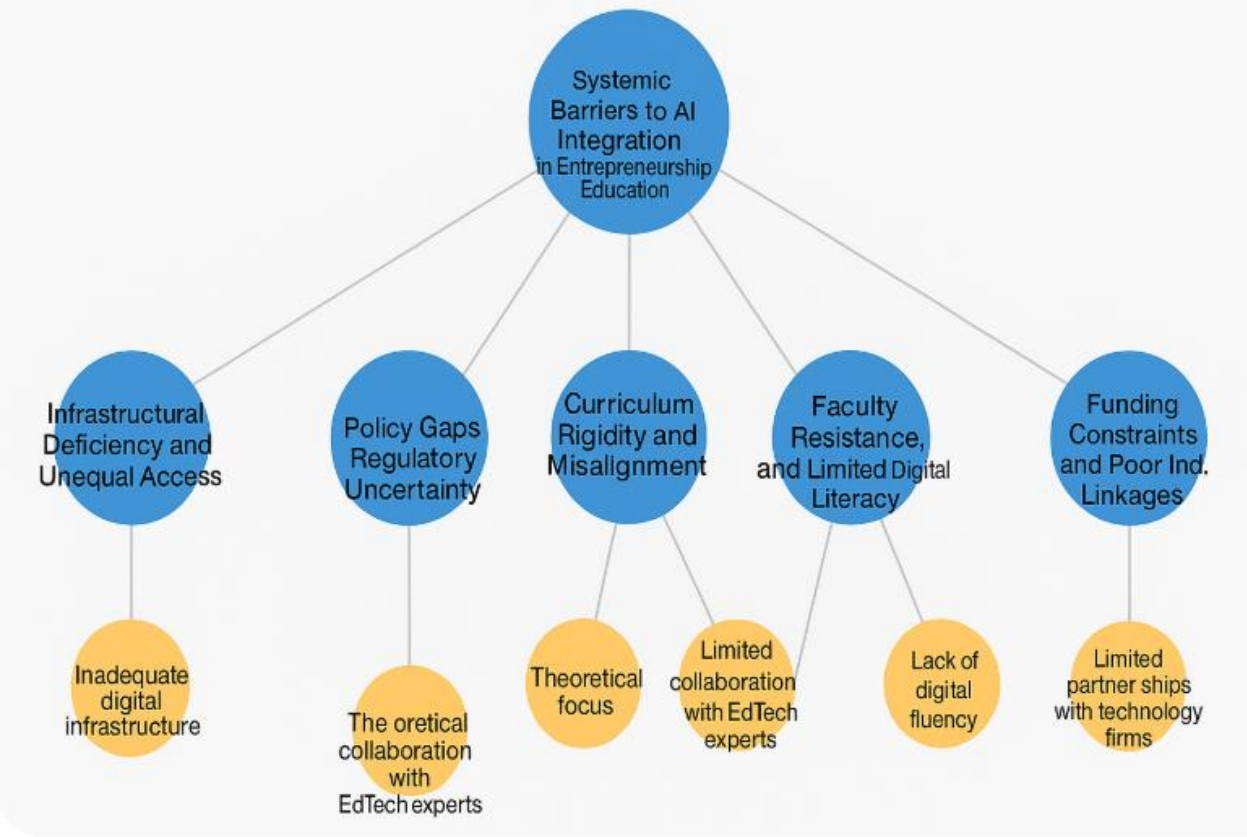
4.4 Faculty Resistance and Limited Digital Literacy

Many educators in Nigeria lack digital fluency and are not adequately trained to integrate AI into their teaching practices (Asiyanbola et al., 2025). In some cases, faculty members exhibit resistance to AI adoption due to fears of job displacement or discomfort with technology-driven pedagogies (Abubakar et al., 2025). This cultural resistance, coupled with limited exposure to AI tools, makes it difficult for even willing educators to incorporate AI effectively into entrepreneurship training.

4.5 Funding Constraints and Poor Industry Linkages

Limited government funding for higher education further constrains the adoption of AI tools and infrastructure. Most institutions prioritize salary obligations and basic operations over digital innovation (Uriri & Mmom, 2025). In addition, weak partnerships between universities and private-sector technology firms limit access to AI solutions and mentorship programs that could enhance entrepreneurship education (Jim et al., 2025).

The Nigerian context presents a complex mix of promise and constraint. While the interest in AI is growing, systemic issues such as poor infrastructure, unclear policy, outdated curricula, and digital illiteracy continue to hinder its integration into entrepreneurship education. Addressing these barriers will require a multi-stakeholder approach involving government, academia, and the private sector.



Barriers to Entrepreneurial Education

While systemic barriers to AI integration are widespread across Nigerian higher education institutions, Ahmadu Bello University (ABU), Zaria provides an illustrative example of how these challenges manifest in practice. As one of Nigeria's largest federal universities with over 50,000 students and a vast multi-campus structure ABU faces infrastructural and administrative constraints that directly affect the adoption of digital technologies, including AI, in teaching and learning.

One of the most documented challenges at ABU is infrastructural instability, particularly unreliable electricity and intermittent broadband connectivity. Reports from the university's ICT Directorate (ABU ICT Policy, 2021) highlight that only a limited number of faculties have stable fiber-optic access, while most departments rely on slower wireless connections. Entrepreneurship courses delivered at the Faculty of Administration and the School of Business and Entrepreneurship Studies, for example, frequently experience connectivity disruptions, limiting the feasibility of AI-based platforms such as adaptive learning systems, simulation tools, or cloud-based collaborative workspaces.

In addition, ABU's computer laboratories especially those serving large general courses remain under-equipped. According to the university's 2023 ICT infrastructure report, several labs operate with outdated hardware incapable of supporting modern AI applications. This problem is compounded by the university's rural location in Samaru, Zaria, where commercial broadband penetration is relatively low compared to Lagos or Abuja. These location-based disparities create a structural barrier that is more severe at ABU than at many private urban universities experimenting with AI-supported learning.

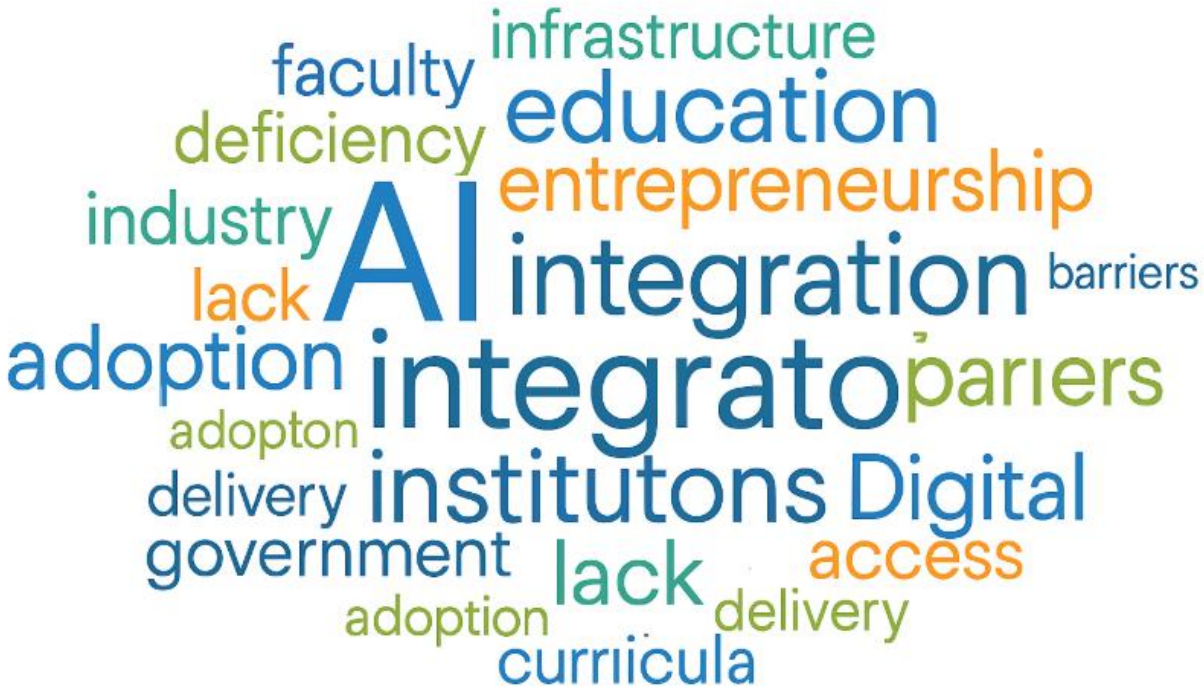
Financial constraints further limit technological modernization. Internal budget circulars and communiqués from ABU's Senate highlight that funding is often prioritized for essential services such as facility maintenance, staff salaries, and accreditation requirements. Consequently, digital innovation including AI adoption does not receive sustained budgetary commitment. While ABU participates in annual TETFund ICT support interventions, these funds are frequently spread across multiple departments, resulting in minimal impact on AI readiness.

From a policy standpoint, ABU does not currently have a dedicated AI strategy or implementation roadmap. Its ICT Policy (revised in 2021) emphasizes digital literacy and e-learning support but does not explicitly address AI integration. Unlike institutions such as Covenant University which has piloted AI-driven research clusters ABU's adoption of AI remains ad-hoc and lecturer-driven. For instance, individual lecturers in Computer Science and Economics occasionally use AI tools for research analytics, but these practices are not institutionalized within entrepreneurship courses.

Curriculum rigidity remains another structural barrier. The entrepreneurship curriculum at ABU, guided by the National Universities Commission (NUC) BMAS, continues to prioritize traditional enterprise development concepts (e.g., feasibility studies, business plan writing, and manual case analysis). There are no university-wide directives requiring the incorporation of AI-based learning tools such as automated market analysis engines, digital prototyping software, or AI-enhanced ideation platforms. This creates a gap between student needs in a digital economy and the curriculum delivered.

Finally, faculty digital readiness remains a challenge. Workshops organized by the ABU Centre for Learning and Teaching Development (CLTD) show that many lecturers possess limited exposure to AI-assisted teaching methods. Faculty apprehension stemming from concerns about academic integrity, workload changes, and unfamiliarity with AI ethics affects adoption decisions. Unlike universities with structured digital skills certification programs, ABU lacks large-scale, mandatory staff training on AI pedagogy, further slowing integration into entrepreneurship education.

ABU illustrates how national-level challenges such as inadequate infrastructure, limited policy direction, and low faculty readiness manifest in concrete and institution-specific ways. While not a formal case study, ABU serves as a representative example of the constraints faced by many large public universities in Nigeria seeking to integrate AI into entrepreneurship education.



The systemic barriers highlights access, data, digital, CSR, and sustainability present tangible challenges for Ahmadu Bello University (ABU) as it seeks to integrate AI technologies into entrepreneurship education. For ABU, these barriers manifest concretely through persistent infrastructural deficits, including limited broadband coverage in key faculties, aging computer laboratories, and irregular electricity supply all issues recognized in the university's ICT Policy (2021) and subsequent Senate ICT memos. These limitations directly affect the university's capacity to deploy AI-driven learning systems, digital simulations, or cloud-based entrepreneurial tools. Furthermore, the absence of a national AI framework means ABU must rely on fragmented internal digital-learning guidelines that do not explicitly address AI adoption, resulting in inconsistent implementation across departments.

Curriculum rigidity further complicates integration efforts. Entrepreneurship courses at ABU remain aligned with the traditional NUC BMAS structure, leaving minimal room for AI-supported pedagogies or digitally enhanced market-analysis tools. Additionally, faculty preparedness remains low, as indicated by the limited participation rates in digital-skills workshops organized by the ABU Centre for Learning and Teaching Development. This creates cultural and technical resistance among staff who may be unfamiliar with AI ethics, data governance, or AI-assisted instructional models.

To address these barriers, ABU and similar Nigerian universities must pursue a coordinated strategy that involves strengthening ICT infrastructure, developing institutional AI guidelines, and investing in sustained faculty development programs. Collaboration with government agencies, industry partners, and EdTech developers will be essential for establishing scalable AI-learning ecosystems. Such interventions would enable ABU to integrate AI meaningfully into its entrepreneurship curriculum, helping to produce graduates equipped with the digital and analytical competencies required to succeed in a technology-driven economy.

5. The Way Forward: Strategic Recommendations

To harness the full potential of Artificial Intelligence (AI) in enhancing entrepreneurship education in Nigeria, a strategic, inclusive, and ethical approach is essential. The following recommendations are proposed to address the challenges identified and provide a roadmap for sustainable implementation:

5.1 Develop a National AI-in-Education Policy Framework

The Federal Ministry of Education, in collaboration with the National Universities Commission (NUC), National Board for Technical Education (NBTE), and relevant stakeholders, should develop a comprehensive AI-in-education policy. This framework must define ethical standards, promote equity in access, and provide regulatory clarity for AI integration in entrepreneurship curricula (Onyejegbu, 2023; Ogunbodede & Atchrim, 2025). It should also prioritize entrepreneurship as a core driver for economic development in the digital age.

5.2 Promote AI Capacity-Building for Educators

There is an urgent need to invest in professional development programs that equip entrepreneurship educators with digital skills, AI literacy, and pedagogical strategies for integrating AI into teaching. Workshops, certification programs, and partnerships with EdTech firms can help educators gain the competence and confidence to apply AI tools in their classrooms (Asiyanbola et al., 2025; Abubakar et al., 2025).

5.3 Design Context-Specific, Flexible AI-Enhanced Curricula

Curriculum designers should collaborate with AI developers, industry experts, and educators to embed AI tools and simulations into entrepreneurship education. The curriculum should remain flexible and adaptive, integrating local business case studies, real-time market data, and ethical frameworks to reflect Nigeria's socio-economic realities (Olupayimo & Edeh, 2025; David, 2025). Emphasis should be placed on critical thinking, ethical decision-making, and digital entrepreneurship.

5.4 Invest in Infrastructure and Low-Tech AI Solutions

To reduce the digital divide, government and institutional leaders must prioritize infrastructure development such as internet access, power supply, and computer labs especially in rural and public tertiary institutions. Meanwhile, investment in low-bandwidth or offline AI tools can ensure that students in underserved areas are not excluded from AI-enhanced learning (Bali et al., 2024; Yakubu, 2024).

5.5 Foster Public-Private Partnerships (PPP)

Strategic alliances between universities and private-sector AI companies can facilitate access to tools, training, and funding. These partnerships can support entrepreneurship hubs, AI-powered incubators, and mentorship platforms that provide students with hands-on experience in digital venture creation (Jim et al., 2025; Kangiwa et al., 2024).

5.6 Ensure Ethical Implementation and Data Protection

Institutions should adopt ethical AI guidelines that protect student data, ensure algorithm transparency, and safeguard against bias in automated learning environments. This includes creating institutional review boards and data governance structures to oversee AI deployment in academic settings (Shittu et al., 2024; Edu & Uwelegbewe, 2025).

This article believes that implementing these strategic recommendations, Nigerian higher education institutions can unlock the transformative power of AI in entrepreneurship education while safeguarding human values, inclusion, and contextual relevance. This balance is crucial for nurturing a generation of digitally empowered, ethically grounded entrepreneurs ready to drive national development.

6. Conclusion

The integration of Artificial Intelligence (AI) into entrepreneurship education in Nigeria holds immense potential to transform how students learn, think, and act as future business innovators. Hence, enabling personalized learning, real-time business simulations, and data-driven instructional support, AI can address many limitations of traditional teaching approaches and foster a new generation of entrepreneurial thinkers. However, the benefits of AI cannot be realized without acknowledging and addressing the ethical, infrastructural, and systemic challenges that accompany its use particularly in developing contexts like Nigeria.

This paper has critically examined the dual nature of AI's role in entrepreneurship education both as a tool of innovation and a source of risk. While AI can accelerate skill acquisition, bridge knowledge gaps, and offer scalable learning solutions, its adoption must be guided by inclusive policies, teacher readiness, and robust ethical safeguards. Nigeria's unique socio-economic and technological landscape requires a strategic and context-sensitive approach to ensure that AI enhances not replaces the human-centered values critical to entrepreneurship.

Ultimately, a collaborative effort among educators, policymakers, technologists, and private-sector partners is essential to reimagine entrepreneurship education in Nigeria. Thus, AI can become not just a digital aid, but a true catalyst for sustainable economic growth, innovation, and national development.

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