

The Role of Vocational Education and Artificial Intelligence on Entrepreneurship for Skill Development in Nigeria

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ABSTRACT

Nigeria faces persistent youth unemployment, a widening skills gap, and limited industrial absorption, underscoring the need for innovative approaches to workforce development. Vocational education offers practical, industry-relevant skills, while entrepreneurship fosters self-reliance and job creation. The integration of Artificial Intelligence (AI) into vocational education presents transformative opportunities for skill acquisition, personalized learning, and simulation of real-world scenarios. AI-driven tools enhance entrepreneurial training through market analytics, business modeling, and virtual simulations, enabling data-informed decision-making and reducing the risks of enterprise creation. However, challenges such as inadequate infrastructure, limited educator capacity, digital divides, and slow policy adaptation hinder the effective adoption of AI in vocational training. By fostering synergy between vocational education, AI, and entrepreneurship, Nigeria can cultivate a technologically competent, innovation-driven workforce capable of thriving in the digital economy. Strategic interventions such as increased investment in AI-enabled training infrastructure, capacity building for educators, and stronger public-private partnerships are essential to bridging the skills gap. Leveraging vocational education and AI for entrepreneurship development can reduce unemployment, stimulate inclusive economic growth, and position Nigeria competitively in the global knowledge economy

INTRODUCTION

Nigeria, like many developing nations is grappling with the dual challenges of high youth unemployment and a widening skills gap in its workforce. According to the National Bureau of Statistics (2023), over 40% of Nigerian youths are unemployed or underemployed, a situation exacerbated by rapid population growth, inadequate education systems, and limited industrial absorption capacity. Traditional academic pathways often emphasize theoretical knowledge over practical skills leaving many graduates ill-prepared for the realities of the labor market. Vocational education emerges as a vital instrument for equipping individuals with hands-on competencies and entrepreneurial skills needed to create self-employment opportunities and contribute to sustainable national development. Vocational Education and Training (VET) focuses on imparting technical, occupational, and entrepreneurial skills aligned with the needs of industries and communities. It moves beyond mere classroom learning to practical, skill-based instruction that can foster innovation, problem-solving, and enterprise creation. According to Audu and Ankeli (2022) have emphasized that integrating entrepreneurship into vocational training develops a self-reliant mindset, reduces dependency on white-collar jobs, and promotes small and medium-scale enterprises (SMEs), which are the backbone of economic growth.

One of the most significant technological disruptors reshaping the future of work and education globally is Artificial Intelligence (AI). AI encompasses a range of digital technologies such as machine learning, natural language processing, and intelligent tutoring systems that enable machines to perform cognitive tasks traditionally requiring human intelligence. In the field of education, AI offers innovative solutions for personalized learning, skills simulation, intelligent assessment, and data-driven decision-making. When applied to vocational education, AI can simulate real-world technical tasks enhance the learning experience, and bridge gaps between theory and practice. According to Okorieocha and Ugwunali (2025) argue that AI has the potential to revolutionize technical and vocational education by improving access, relevance, and quality, thereby preparing a workforce that can thrive in the Fourth Industrial Revolution. The integration of AI into vocational education can also amplify entrepreneurship development. AI-driven tools can assist in market research, business modeling, financial forecasting, and customer analytics, enabling young entrepreneurs to make data-driven decisions. Furthermore, virtual reality (VR) and augmented reality (AR), powered by AI, can create immersive environments for learners to practice complex technical operations or simulate entrepreneurial scenarios without incurring real-world risks.

The National Board for Technical Education (NBTE) (2022) and the Industrial Training Fund (ITF) (2024), have made efforts to standardize vocational training curricula and insert entrepreneurship education in technical institutions. Additionally, the Federal Government's 3 Million Technical Talent (3MTT) initiative is focused on training youths in digital and AI-related skills to meet the demands of emerging industries. Despite these efforts, the

implementation of AI in vocational training remains limited due to challenges such as inadequate infrastructure, digital divides, and insufficient educator capacity. The intersection of vocational education, AI, and entrepreneurship thus presents both opportunities and challenges for Nigeria's socio-economic transformation. Vocational education lays the foundation for practical skill acquisition; AI introduces innovative, scalable, and adaptive learning mechanisms; and entrepreneurship channels these skills into productive ventures that generate employment and wealth. By combining these three elements, Nigeria can move closer to solving its unemployment crisis while fostering a knowledge-based economy.

LITERATURE REVIEW

Problem Statement

Nigeria is currently facing a persistent unemployment and underemployment crisis, particularly among youths who constitute more than 60% of the population. The National Bureau of Statistics (2023) reports that a significant proportion of graduates from tertiary institutions lack the practical skills required by industries, resulting in a mismatch between the labor market demands and the competencies of job seekers. The conventional education system remains heavily theoretical, producing graduates who rely mainly on white-collar job opportunities in a shrinking public sector rather than creating enterprises or engaging in productive self-employment. This has contributed to rising poverty, insecurity, and economic stagnation. Although vocational education and training (VET) was introduced to address these gaps, its implementation in Nigeria remains weak. Many vocational training institutions suffer from obsolete curricula, inadequate infrastructure, poor funding, and lack of qualified instructors, which limits their ability to produce graduates with industry-relevant skills.

The global economy is being transformed by Artificial Intelligence (AI) and related digital technologies which are redefining the nature of work and entrepreneurship. AI-driven industries require workers who can operate in data-rich, automated, and intelligent environments. Unfortunately, Nigerian vocational education has been slow to embrace AI as a tool for enhancing skill acquisition and entrepreneurial training. According to Okorieocha and Ugwunali (2025) indicate, the adoption of AI in technical and vocational education in Nigeria is still limited due to inadequate digital infrastructure, lack of AI tools in training institutions, insufficient awareness, and low educator capacity in emerging technologies. As a result, the country education is faced by a triple challenge: "A traditional education system that does not adequately prepare students for self-employment", "A vocational education sector that lacks the modern tools and methodologies to deliver high-quality, industry-relevant training" and "Slow integration of AI technologies into skill development and entrepreneurship training, limiting the ability of Nigerian youths to compete in the global knowledge economy".

METHODOLOGY

Objectives of the Study

The main objective of this paper is to examine the role of vocational education and artificial intelligence (AI) in entrepreneurship for skill development in Nigeria.

The Specific objectives of the study is seeking to:

1. Assess the contribution of vocational education in promoting entrepreneurship and equipping Nigerian youths with employable skills.
2. Explore the synergy between vocational education and AI in developing an innovation-driven, entrepreneurship-oriented workforce.
3. Identify the challenges hindering the integration of AI into vocational education for entrepreneurship development in Nigeria.
4. Recommend strategic interventions and policies for leveraging vocational education and AI to bridge Nigeria's skills gap and reduce youth unemployment.

Significance of the Study

This study is significant for several reasons such as it provides valuable insights for policymakers, particularly the Federal Ministry of Education, the National Board for Technical Education (NBTE), and other agencies involved in skills development, on how to modernize vocational training with AI-driven solutions. Educational Institutions such as polytechnics, colleges of education, and vocational centers, should highlights innovative ways to integrate AI tools into curricula, thereby improving teaching quality and aligning training with global industry standards. By showing how entrepreneurship is developing AI can enhance entrepreneurial training, the study benefits government and private organizations promoting youth entrepreneurship, such as the Industrial Training Fund (ITF) and Small and Medium Enterprises Development Agency of Nigeria (SMEDAN). Nigerian youths and graduates will benefit from understanding how vocational education and AI can equip them with practical skills, entrepreneurial thinking, and digital literacy to create sustainable businesses and compete in the global economy. The study adds to the growing body of literature on vocational education, AI adoption, and entrepreneurship development in the Nigerian context, serving as a reference for further research.

RESULTS AND DISCUSSION

Synergy of Vocational Education, AI, and Entrepreneurship

Cultivating Entrepreneurial Culture. According to Ugwu et al (2024), shows that when VET curricula include entrepreneurship modules, students develop a mindset oriented towards starting businesses, solving local problems, and engaging risk taking behaviors the basis of entrepreneurship culture. AI can augment this by simulating business scenarios, modeling local entrepreneurial opportunities, and providing feedback loops. Enhancing Skills via AI-driven VET, When AI tools such as adaptive learning systems, virtual simulations of machinery, interactive training bots, and personalized learning paths are embedded in technical training, students acquire competencies faster and more deeply. Such systems help learners practice, fail, and retry in safe environments before launching real enterprises.

Entrepreneurship-ready Workforce, An AI-augmented VET ecosystem develops a workforce that can handle modern technologies, innovate, and turn skills into enterprise. Graduates gain not only trade skills but also capacity in digital literacy, data driven decision making, and market analysis Ugwu et. al., (2024). Programs like Nigeria's 3 million Technical Talent (3MTT) train thousands in AI, machine learning, data science, software and cloud thus preparing youth for tech entrepreneurship and digital ventures by 2027

Challenges in Integrating Vocational Education and AI for Entrepreneurship Development

Despite Promise, Several Constraints Persist:

- A. Inadequate infrastructure and funding for AI-enabled training in VET institutions
- B. Low availability of AI tools and educator training as found in Abia State programs
- C. Uneven access and digital divide, especially across rural and disadvantaged groups
- D. Policy gaps and slow adaptation, as AI integration into curricula remains uneven
- E. Cultural and educational inertia traditional vocational methods may resist AI adaptation without support

Way Forward: Strategic Interventions

- A. Increase investment in vocational education infrastructure and AI labs.
- B. Provide capacity building for educators on AI tools and digital pedagogy.
- C. Integrate AI into vocational curricula to align with industry demands.
- D. Promote public-private partnerships (PPPs) for resource mobilization.
- E. Digitize indigenous apprenticeship systems.
- F. Bridge the digital divide by improving rural ICT access and connectivity.
- G. Conduct awareness campaigns on AI benefits for skill development.
- H. Establish regional AI innovation hubs linked to entrepreneurship programs.
- I. Strengthen policy coordination and monitoring to ensure effective AI adoption.
- J. Expand programs like 3MTT to include AI-driven entrepreneurship training.

CONCLUSIONS AND RECOMMENDATIONS

Vocational education remains a critical pathway for equipping Nigerian youths with the practical skills required for self-employment and national development. However, on its own, it is no longer sufficient to meet the demands of the 21st-century digital economy. Artificial Intelligence (AI) has emerged as a transformative tool that can revolutionize vocational education by enhancing teaching methods, personalizing learning, simulating real-world experiences, and fostering entrepreneurial problem-solving. The synergy of vocational education and AI holds immense potential for entrepreneurship development, as it empowers youths with both technical and digital competencies, enabling them to create innovative enterprises, generate jobs, and

contribute to economic growth. Despite these opportunities, challenges such as poor infrastructure, inadequate funding, limited educator capacity, and the digital divide hinder the full integration of AI into Nigeria's vocational training landscape. Addressing these challenges through increased investment, policy reforms, partnerships, and capacity building will ensure that Nigeria develops a skilled, innovation-driven workforce capable of competing in the global knowledge economy. By leveraging vocational education and AI, Nigeria can not only reduce youth unemployment but also stimulate sustainable entrepreneurship and inclusive economic growth.

FURTHER STUDY

This research still has limitations, so it is necessary to conduct further research related to the topic of The Role of Vocational Education and Artificial Intelligence on Entrepreneurship for Skill Development in Nigeria in order to perfect this research and increase insight for readers.

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