



## **REVAMPING VOCATIONAL EDUCATION SKILLS THROUGH ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE DEVELOPMENT IN NIGERIA**

Iwalewa Omokhekpe UZOKA and Charles Chukwuma OBIORA  
Department of Agricultural Education, School of Secondary Education (Vocational)  
Federal College of Education (Technical), Asaba, Delta State. Nigeria.

*Journal of Research in Vocational and Technical Education (JORVTED), 2026, 5(1), 143–147*

*Publication history: Received on 23 January 2026; revised on 07 March 2025; accepted on 10 May 2026*

*Article DOI: <https://doi.org/10.5281/zenodo.20370196>*

### **Abstract**

*Vocational education is central to equipping learners with practical and technical skills that foster employability, entrepreneurship, and national development. Despite its potential, vocational education in many developing nations remains underutilized, constrained by outdated curricula, infrastructural deficits, and poor societal perception. With the advent of Artificial Intelligence (AI), a transformative opportunity arises to modernize vocational education in ways that align with Sustainable Development Goals (SDGs). This paper explores the potential of AI to revamp vocational education, situating it within the context of sustainable development. It examines global and local trends in AI integration, the current state of vocational education, and barriers to implementation. Case studies from Europe, Asia, and Africa are highlighted to illustrate practical applications. Policy recommendations are proposed to ensure equitable, inclusive, and sustainable adoption of AI in vocational education. The paper concludes that AI is not merely a tool but a catalyst for creating future-ready, resilient, and sustainable vocational training systems.*

**Keywords:** *Vocational Education, Artificial Intelligence, Sustainable Development*

### **Introduction**

Technical and Vocational Education and Training (TVET) has historically been a driver of industrialization, productivity, and innovation. It prepares individuals with the competencies needed to succeed in evolving labor markets. In developing countries, however, TVET has been marginalized, often seen as a second-tier option compared to academic education (Oketch, 2019). This has undermined its contribution to addressing youth unemployment, poverty, and inequality. At the same time, societies worldwide face the dual challenge of adapting to rapid technological change while ensuring sustainable development. The United Nations Sustainable Development Goals (SDGs) — particularly Goal 4 (Quality Education), Goal 8 (Decent Work and Economic Growth), and Goal 9 (Industry, Innovation, and Infrastructure) — emphasize the role of education in shaping resilient, inclusive, and sustainable societies (UN, 2015). Artificial Intelligence (AI), a transformative force of the Fourth Industrial Revolution, offers new possibilities for vocational education. With its applications in adaptive learning, predictive analytics, and immersive simulations, AI has the potential to revolutionize how skills are taught, acquired, and certified. This paper positions AI as a critical driver for revamping vocational education to meet the demands of sustainable development. It argues that while challenges persist, strategic adoption of AI can transform vocational education into a dynamic, inclusive, and future-ready system.

Corresponding Author: Iwalewa Omokhekpe UZOKA

Copyright © 2026 Author(s) retain the copyright of this article.



## Conceptual Framework

### Vocational Education

Vocational education refers to organized learning activities designed to equip individuals with knowledge, skills, and attitudes for effective participation in the workforce (UNESCO-UNEVOC, 2016). Its goals include fostering employability, promoting entrepreneurship, and supporting national economic growth.

### Artificial Intelligence

Artificial Intelligence (AI) is defined as the ability of computer systems to perform tasks that normally require human intelligence, such as reasoning, problem-solving, and learning (Russell & Norvig, 2020). In education, AI applications include personalized tutoring, intelligent assessment systems, and immersive simulations.

### Sustainable Development

The World Commission on Environment and Development (WCED, 1987) defines sustainable development as meeting present needs without compromising future generations' ability to meet theirs. Within the educational context, sustainability involves integrating environmental, social, and economic dimensions into learning.

### Intersection of AI, Vocational Education, and Sustainability

AI-driven vocational education can bridge skills gaps, foster green innovation, and empower marginalized groups, thereby aligning with sustainability's economic, social, and ecological pillars.

### Current State of Vocational Education

Vocational education globally, and particularly in developing countries, faces multiple challenges:

1. Curriculum Outdatedness – Training often lags behind labor market needs. For instance, while industries demand digital and green skills, curricula in many African countries remain focused on traditional trades (African Union, 2020).
2. Infrastructural Deficits – Workshops, laboratories, and digital resources are poorly equipped, undermining practical learning.
3. Teacher Shortages and Capacity Issues – Many instructors lack exposure to modern pedagogy or digital competencies.
4. Negative Societal Perceptions – In many cultures, TVET is stigmatized as an option for low achievers, reducing student enrollment and investment (Oketch, 2019).

These challenges result in graduates who are often ill-prepared for the demands of modern labor markets.



## **Artificial Intelligence in Vocational Education**

AI has the potential to address these challenges through multiple pathways:

### **Personalized and Adaptive Learning**

AI-powered platforms can assess learners' strengths and weaknesses, tailoring content to their pace and style. This ensures individualized learning experiences, boosting motivation and retention (Chen et al., 2020).

### **Immersive Simulations**

Virtual and augmented reality tools powered by AI can replicate real-world environments, allowing students to practice technical skills in safe, controlled spaces. For example, China has introduced AI-driven virtual laboratories for vocational students in engineering and health sciences (Zhang, 2021).

### **Predictive Analytics**

AI can analyze learner performance to identify at-risk students, recommend interventions, and inform curriculum design. In Germany, predictive analytics supports its dual system of vocational training by aligning student skills with industry needs.

### **Automated Assessments and Certifications**

AI-based assessment tools provide real-time feedback, reduce grading biases, and generate digital certifications validated on blockchain networks.

## **Global Case Studies**

1. Germany's Dual System: Germany integrates AI into vocational training through predictive analytics and industry partnerships, ensuring graduates meet evolving industrial demands.
2. China: Vocational schools in China employ AI-driven platforms for personalized instruction and smart campus management (Zhang, 2021).
3. Kenya and Rwanda: Pilot projects use AI chatbots to provide agricultural and technical training to rural youth, bridging the digital divide (World Bank, 2022).

These cases illustrate that while AI adoption requires investment, it offers scalable solutions for modernizing vocational education.

## **AI and Sustainable Development**

AI-enhanced vocational education supports sustainability in several ways:

- **Economic Sustainability:** By equipping learners with skills for emerging industries (ICT, renewable energy, robotics), AI fosters entrepreneurship and employment.
- **Social Sustainability:** AI-driven assistive technologies ensure inclusion of learners with disabilities, promoting equitable access.
- **Environmental Sustainability:** AI can model eco-friendly industrial practices and integrate green skills (e.g., renewable energy maintenance, sustainable agriculture) into training programs.

Thus, AI enables vocational education to contribute directly to SDGs 4, 8, and 9.



### **Barriers and Challenges**

Despite its potential, several barriers hinder AI integration:

1. **Infrastructure and Digital Divide:** In many parts of Africa, unreliable electricity and limited internet access restrict AI deployment.
2. **Teacher Preparedness:** Educators often lack training to use AI tools effectively.
3. **Ethical Concerns:** Fears of job displacement and data privacy issues limit acceptance of AI in education.
4. **Policy and Funding Constraints:** Limited government funding and lack of comprehensive AI strategies delay adoption.
5. **Cultural Resistance:** Societal skepticism toward AI adoption, fueled by fear of cultural erosion, poses barriers in traditional contexts.

### **Conclusion**

Artificial Intelligence represents a transformative opportunity to modernize vocational education and align it with sustainable development imperatives. By personalizing learning, enabling immersive simulations, and bridging the skills gap, AI has the capacity to revamp vocational education into a future-ready system. However, challenges of infrastructure, policy, and teacher preparedness must be addressed. Policymakers, educators, and industry leaders must collaborate to harness AI responsibly and inclusively, ensuring vocational education becomes a driver of sustainable growth in the 21st century.

### **Policy Implications and Recommendations**

To maximize AI's transformative potential, the following measures are necessary:

1. **Integrate AI into National TVET Policies:** Governments should explicitly include AI in vocational education strategies.
2. **Strengthen Public-Private Partnerships:** Partnerships with technology firms can provide infrastructure, expertise, and funding.
3. **Reskill Teachers:** Continuous professional development should focus on AI literacy and digital pedagogy.
4. **Promote Inclusivity:** Policies must prioritize women, rural populations, and persons with disabilities in AI-driven vocational programs.
5. **Secure Sustainable Financing:** Governments and international donors should establish dedicated funds for AI integration in TVET.
6. **Adopt Regional Frameworks:** African Union and ECOWAS policies should harmonize AI adoption in vocational education across countries.

### **References**

African Union. (2020). *Continental Strategy for Technical and Vocational Education and Training (TVET)*. Addis Ababa: AU.



- Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, 8, 75264–75278.
- Oketch, M. (2019). Financing technical and vocational education and training (TVET): A global perspective. *International Journal of Educational Development*, 65, 25–30.
- Russell, S., & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach* (4th ed.). Pearson.
- UNESCO-UNEVOC. (2016). *Greening Technical and Vocational Education and Training*. Bonn: UNESCO-UNEVOC.
- UNESCO. (2022). *Transforming Technical and Vocational Education and Training for Sustainable Futures*. Paris: UNESCO.
- United Nations. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. New York: UN.
- World Bank. (2022). *The Future of Jobs in Africa: Harnessing the Potential of AI and Technology*. Washington, DC: World Bank.
- Zhang, H. (2021). AI in Chinese vocational education: Opportunities and challenges. *Journal of Educational Technology Development and Exchange*, 14(1), 1–15.
- WCED (World Commission on Environment and Development). (1987). *Our Common Future*. Oxford University Press.