ARTIFICIAL INTELLIGENCE AS A TOOL TO ENHANCE QUALITY VOCATIONAL EDUCATION FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

DR. MRS. VERONICA AKANDUDU KULO DEPARTMENT OF BUSINESS EDUCATION
FEDERAL COLLEGE OF EDUCATION OBUDU
CROSS RIVER STATE
DR. MRS AGBOGO REGINA AGOR DEPARTMENT OF BUSINESS EDUCATION
FEDERAL COLLEGE OF EDUCATION OBUDU
CROSS RIVER STATE

AND

DR. EKUM, BAJIE ODU
DEPARTMENT OF SOCIAL STUDIES
FEDERAL COLLEGE OF EDUCATION OBUDU
CROSS RIVER STATE

Abstract

The increasing advancement of Artificial Intelligence (AI) has significantly transformed various sectors of society, including education and workforce development. In Nigeria, vocational education remains a critical pathway for equipping individuals with practical skills necessary for employment, entrepreneurship, and economic growth. However, the effectiveness of vocational education in the country has been hindered by numerous challenges such as outdated instructional methods, inadequate training facilities, limited access to modern technologies, and insufficient alignment with labour market needs. This paper examines Artificial Intelligence as a strategic tool for enhancing the quality of vocational education for sustainable development in Nigeria. Using a conceptual and analytical approach with the Human Capital Theory, by Becker (1993), the paper explores how AI technologies such as intelligent tutoring systems, virtual simulations, adaptive learning platforms, and automated assessment systems can improve teaching, learning, and skill acquisition in vocational education. The paper further highlights the potential contributions of AIdriven vocational training to sustainable development through improved employability, innovation, and economic productivity. Despite these opportunities, the adoption of AI in Nigerian vocational institutions faces several challenges including poor digital infrastructure, inadequate technical capacity among instructors, funding limitations, and digital inequality. The paper therefore recommends increased government investment in digital infrastructure, teacher capacity building, curriculum reform, and stronger collaboration between educational institutions and industry stakeholders. The paper concludes that strategic integration of Artificial Intelligence into vocational education can significantly strengthen human capital development and contribute to sustainable development in Nigeria.

Keywords: Artificial intelligence, vocational education, technical education, sustainable development, Nigeria

Introduction

Education plays a vital role in the development of any nation because it equips individuals with the knowledge, skills, and competencies needed for economic productivity and social progress. Through education, people develop the capacity to contribute meaningfully to national growth and societal well-being. Among the

various forms of education, vocational education holds a particularly important place because it emphasizes the acquisition of practical and technical skills that prepare individuals for employment, self-reliance, and entrepreneurship. In many developing countries, including Nigeria, vocational education is widely recognized as a key strategy for tackling youth unemployment, reducing poverty, and promoting inclusive economic development (Okoye & Arimonu, 2016). Despite its significance, vocational education in Nigeria continues to face several challenges that limit its ability to effectively prepare learners for the world of work. Many vocational and technical institutions struggle with inadequate infrastructure, outdated training facilities, insufficient funding, and limited access to modern industrial technologies. As a result, graduates from some vocational programmes often lack the practical competencies required by employers, leading to a growing gap between the skills acquired in training institutions and the demands of the labour market. This situation has raised concerns about the quality and relevance of vocational education in the country.

In recent years, however, rapid technological advancements have opened up new possibilities for transforming education systems across the globe. One of the most influential technological innovations of the twenty-first century is Artificial Intelligence (AI). Artificial Intelligence refers to the capability of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making (Russell & Norvig, 2021). Within the education sector, AI technologies are increasingly being applied to enhance teaching, learning, and educational management. For instance, AI-powered tools such as intelligent tutoring systems, virtual simulations, automated assessment systems, and adaptive learning platforms are helping to create more engaging and personalized learning environments for students. These technological developments present valuable opportunities for improving the quality of vocational education. By integrating Artificial Intelligence into vocational training programmes, learners can gain access to interactive learning platforms, simulated practical environments, and data-driven instructional support that enhance both theoretical understanding and practical skill acquisition. Such innovations can help bridge the gap between classroom learning and real-world industrial practices.

Considering Nigeria's growing need for skilled workforce capable of supporting industrialization, technological advancement, and economic diversification, the adoption of Artificial Intelligence in vocational education has become increasingly important. The integration of AI into vocational training programmes offers a promising pathway for improving the quality, relevance, and effectiveness of skills development in the country. It is against this background that this paper examines Artificial Intelligence as a strategic tool for enhancing vocational education and promoting sustainable development in Nigeria. This paper will look at the following subheadings, Artificial Intelligence as a tool for enhancing the quality of vocational education for sustainable development in Nigeria. Artificial Intelligence in improving teaching and learning processes in vocational education in Nigeria, the extent to which the integration of Artificial Intelligence can improve the quality and relevance of vocational training to labour market demands in Nigeria, and challenges associated with integrating Artificial Intelligence into vocational education in Nigeria.

Literature Review and Theoretical Framework

Conceptual Review

Artificial Intelligence

Artificial Intelligence refers to the development of computer systems capable of performing tasks that normally require human intelligence, including learning from experience, recognizing patterns, understanding natural language, and making decisions (Russell & Norvig, 2021). AI technologies are typically based on algorithms and

data-driven models that enable machines to process large volumes of information and generate insights. In education, AI can support teaching and learning through tools such as intelligent tutoring systems, learning analytics, automated assessment platforms, and virtual reality simulations (Holmes, 2019). These technologies enable educators to deliver personalized instruction, monitor student progress, and enhance learner engagement. In contemporary scholarship, AI is understood not merely as automation technology but as a set of adaptive, data-driven systems capable of augmenting human cognitive capacities across multiple sectors such as education, healthcare, governance, security, and economic planning (Holmes et al., 2019).

AI technologies encompass machine learning, natural language processing, predictive analytics, robotics, and intelligent decision-support systems. These technologies function by processing large volumes of data to identify patterns, generate predictions, and support evidencebased decisions (OECD, 2024). AI is conceptually, viewed as a general-purpose technology, similar to electricity or the internet, and with the capacity to reshape national institutions, productivity structures, and development trajectories when effectively integrated into human systems (Brynjolfsson & McAfee, 2017). AI is increasingly conceptualized as a human centered tool one that enhances human intelligence, institutional efficiency, and societal problem-solving rather than replacing human agency (UNESCO, 2021). This perspective emphasizes responsible, ethical, and inclusive AI deployment aligned with societal development goals

Vocational Education

Vocational education refers to a form of education that prepares individuals for specific trades, occupations, or careers by emphasizing the acquisition of practical skills and technical knowledge. According to UNESCO (2016), vocational education focuses on equipping learners with competencies that enable them to participate effectively in the workforce. Vocational education programmes typically cover areas such as engineering technology, construction, agriculture, healthcare, information technology, and skilled crafts. In Nigeria, vocational education is provided through technical colleges, polytechnics, vocational training centres, and other specialized institutions.

Sustainable Development

Sustainable development refers to development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). Sustainable development integrates economic growth, social inclusion, and environmental protection. Education plays a critical role in achieving sustainable development because it equips individuals with the knowledge and skills required to address complex socio-economic and environmental challenges (UNESCO, 2017). In this regard, vocational education can contribute to sustainable development by producing a skilled workforce capable of supporting industrial growth and technological innovation.

Sustainable development integrates economic growth, social inclusion, and environmental protection. Education plays a critical role in achieving sustainable development because it equips individuals with the knowledge and skills required to address complex socio-economic and environmental challenges (UNESCO, 2017). In this regard, vocational education can contribute to sustainable development by producing a skilled workforce capable of supporting industrial growth and technological innovation. Sustainable development extends beyond economic indicators to include human capital development, social equity, democratic governance, technological innovation, and environmental sustainability (Sachs, 2015).

In the 21st century, national development is increasingly knowledge-driven, requiring societies to cultivate analytical capacity, innovation, digital competence, and adaptive problemsolving among citizens and institutions. Education, science, and technology are therefore conceptualized as foundational pillars of sustainable national

development, as they determine a nation's ability to generate solutions to complex challenges such as poverty, unemployment, climate change, insecurity, and governance deficits (UNDP, 2022). Sustainable development is thus both an outcome and a continuous process of capacity building within a nation. According to OECD, 2021), countries that integrate AI into education, governance, and economic systems experience improved institutional efficiency, better policy outcomes, and enhanced workforce readiness. On the other hand in developing perspective like in Nigeria, inadequate infrastructure, limited access to technology, and weak regulatory frameworks can constrain these benefits, moderating the impact of AI on development outcomes (World Bank, 2020; Adeniran & Oyeniran,

2022).

Artificial Intelligence and Vocational Education

Artificial Intelligence has the potential to significantly transform vocational education by improving instructional delivery, learner engagement, and skill development. Several AI-driven technologies can be applied within vocational training environments. Intelligent tutoring systems are AI-powered educational tools designed to provide personalized instruction and feedback to learners. These systems analyze learners' performance and adapt instructional content based on their strengths and weaknesses (Holmes et al., 2019).

In vocational education, intelligent tutoring systems can assist learners in mastering technical procedures and problem-solving skills. Virtual simulations represent one of the most important applications of AI in vocational education. These technologies enable students to practice technical skills in simulated environments that closely resemble real-world situations. For example, students studying engineering, automotive technology, or healthcare can practice complex procedures using computer-based simulations. Such simulations provide safe and costeffective learning environments where students can repeatedly practice tasks without damaging expensive equipment or risking personal injury. Adaptive learning platforms use AI algorithms to personalize the learning experience for each student. These platforms monitor learners' progress and automatically adjust instructional materials to suit their learning pace and abilities. This ensures that students receive targeted support in areas where they require improvement. AI-based assessment systems can evaluate students' performance and provide immediate feedback. Automated grading systems help instructors monitor learner progress more efficiently and identify students who require additional support.

Contributions of AI to Sustainable Vocational Education in Nigeria

The integration of Artificial Intelligence into vocational education can contribute significantly to sustainable development in Nigeria in several ways;

Improving Employability: AI-enhanced vocational training can equip learners with modern technological skills that are highly valued in the labour market. This increases the employability of graduates and reduces unemployment among young people.

Enhancing Entrepreneurial Skills; AI-driven learning environments encourage innovation, creativity, and problem-solving. These competencies are essential for entrepreneurship and selfemployment.

Promoting Industrial Development; A well-trained workforce with advanced technical skills is essential for industrial growth and economic diversification. AI-enhanced vocational education can support sectors such as manufacturing, agriculture, renewable energy, and information technology.Supporting Lifelong Learning; AI-powered online learning platforms provide opportunities for continuous skill development. Workers can upgrade their skills and adapt to changing technological demands throughout their careers.

Challenges of Integrating AI into Vocational Education in Nigeria

Despite the potential benefits, several challenges hinder the adoption of AI technologies in Nigerian vocational institutions. These challenges are;

Inadequate Digital Infrastructure: Many educational institutions in Nigeria lack reliable electricity supply and internet connectivity, which are essential for AI-based learning systems.

Limited Technical Capacity; Many vocational instructors lack the digital literacy and technical expertise required to effectively use AI technologies in teaching.

Funding Constraints; The acquisition and maintenance of AI technologies require significant financial resources. Many vocational institutions face budgetary limitations that restrict technological investments.

Digital Inequality; Not all students have access to personal computers or reliable internet connectivity, which may limit their ability to benefit from AI-driven learning platforms.

Empirical Review

AI-Driven teaching and learning processes in vocational education and Sustainable Development

Liu et al. (2022) investigated how artificial intelligence can support deep learning in the teaching and learning processes of university education. Using a comparative analysis of pre-test and posttest data collected through online questionnaires, the study evaluated whether the integration of AI tools could improve students' knowledge mastery, skill development, and emotional engagement in learning. The findings revealed that AI-supported teaching models significantly enhanced instructional efficiency and promoted deeper student learning. The study further showed that intelligent platforms enable teachers to monitor classroom progress in real time, design more adaptive lessons, and apply personalized teaching strategies. On the students' side, AI tools provided individualized learning support and improved innovative thinking. Consequently, Liu et al. concluded that the integration of AI technologies into educational practices can create more interactive and efficient learning environments.

Kazmaci et al. (2025) examined the factors that influence the sustainable integration of AI technologies in primary school classrooms. The researchers focused particularly on the role of teachers' theoretical and practical knowledge of AI as well as their beliefs and attitudes toward technology. Using data collected from 340 primary school teachers in Northern Cyprus and analyzing the relationships through Structural Equation Modeling (SEM), the study found that teachers' knowledge of AI alone was not sufficient to ensure effective adoption. Rather, positive beliefs and attitudes toward AI significantly mediated the relationship between knowledge and classroom integration. Teachers who possessed both adequate knowledge and positive perceptions of AI were more likely to integrate AI tools into their instructional practices. The authors therefore emphasized the importance of teacher training programs that build not only technical competence but also confidence and positive attitudes toward AI technologies.

In another related study, Fteiha et al. (2025) assessed the readiness of general and special education teachers to adopt AI technologies in classrooms in the United Arab Emirates. Drawing on the Concerns-Based Adoption Model (CBAM) and the Universal Design for Learning (UDL) framework, the researchers explored the relationship between teachers' knowledge, attitudes, and practices regarding AI use. Data obtained from 161 educators were analyzed using structural equation modeling. The results indicated that teachers' attitudes toward AI significantly predicted their classroom practices, while knowledge demonstrated a weaker but still positive influence. The study also revealed that knowledge indirectly influenced AI use through attitudes, highlighting the crucial role of teachers' perceptions in technology adoption. In addition, demographic factors such as gender and

academic role moderated teachers' engagement with AI. The researchers concluded that improving teachers' readiness requires comprehensive professional development programs that enhance both knowledge and positive perceptions of AI technology.

Focusing on the Nigerian context, Ayanwale et al. (2025) explored the adoption of large language models such as ChatGPT among in-service teachers. The researchers used a hybrid analytical approach combining Partial Least Squares Structural Equation Modeling (PLS-SEM) and Artificial Neural Networks (ANN) to examine factors influencing teachers' behavioral intention to use AI tools. The study surveyed 260 Nigerian teachers who had participated in structured training programs on AI technologies. Findings showed that perceived usefulness, perceived ease of use, colleagues' influence, and technology anxiety significantly predicted teachers' intention to use ChatGPT in educational practice. Perceived usefulness emerged as the strongest predictor, while ease of use and positive attitudes were found to be essential in encouraging teachers' engagement with AI tools. However, the study also identified several challenges in resource-constrained environments, including limited digital infrastructure and concerns about privacy and trust. The authors therefore recommended targeted professional development initiatives aimed at strengthening teachers' digital competencies and reducing technology-related anxiety.

From the students' perspective, Ngo et al. (2025) examined university students' intentions to adopt large language models for learning using the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB). The study involved 226 university students in Vietnam who had previous experience using AI-based tools for academic activities. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the researchers found that perceived usefulness, perceived ease of use, and trust in AI significantly influenced students' attitudes toward these technologies. Furthermore, the TPB variables--attitude, subjective norms, and perceived behavioral control--were found to positively affect students' intention to use AI tools for learning. Among these factors, subjective norms (social influence) had the strongest effect, indicating that peer support and social acceptance play an important role in students' adoption of AI technologies.

The study therefore suggested that educational institutions should promote collaborative learning environments and encourage positive social norms around AI usage in education.

AI-Driven Technologies and Sustainable Development

Bukowski and Werbinska-Wojciechowska (2025) examined the role of artificial intelligence in advancing the concept of Maintenance 5.0 within Industry 5.0 systems. Using a systematic literature review guided by the PRISMA methodology, the authors analyzed previous studies on resilience-based maintenance (RBM) in AI-driven industrial environments. Their findings showed that modern industries are increasingly adopting AI technologies such as machine learning and digital twins to enhance system resilience, fault detection, and operational recovery during disruptions. The study also revealed that the integration of AI-driven maintenance strategies supports sustainability goals by reducing resource consumption and improving the collaboration between humans and intelligent machines. However, the researchers identified several gaps, particularly in the areas of AI explainability, sector-specific applications, and ergonomic considerations in human-machine interaction. They therefore recommended further research to strengthen the implementation of Maintenance 5.0 systems that are resilient, intelligent, and human-centered.

Bibri et al. (2024) conducted a comprehensive systematic review exploring the integration of artificial intelligence, artificial intelligence of things (AIoT), and urban digital twin technologies in the planning of sustainable smart cities. The researchers analyzed 185 scholarly publications to understand how these technologies interact to improve environmental planning and decisionmaking. Their findings indicated that the convergence of AI, AIoT, and digital twin technologies enhances data-driven urban planning by enabling cities to

monitor environmental conditions, predict urban challenges, and design sustainable solutions. These technologies were found to be particularly useful in managing urban resources, improving environmental performance, and supporting evidence-based policy decisions. Nevertheless, the study emphasized that the successful implementation of AI-driven smart city systems requires addressing technological complexities, governance challenges, and ethical considerations associated with large-scale data use.

Earlier work by Bibri et al. (2023) also explored the broader convergence of artificial intelligence, the Internet of Things (IoT), and big data technologies in the development of environmentally sustainable smart cities. Through a bibliometric analysis of 2,574 academic documents published over several decades, the study mapped the evolution of research trends in this field. The results revealed that the growing interest in sustainable smart cities has been strongly influenced by global concerns about climate change, environmental degradation, and the pursuit of the Sustainable Development Goals (SDGs). The researchers found that the integration of AI, IoT, and big data enables cities to manage environmental challenges more effectively by improving urban monitoring systems, energy management, and resource optimization. However, the authors also cautioned that these technologies may generate environmental costs, ethical concerns, and regulatory challenges if they are not carefully managed. Consequently, policymakers and urban planners must adopt balanced strategies that maximize technological benefits while minimizing potential risks.

Lau et al. (2023) investigated the contribution of AI-driven technologies to the advancement of women's healthcare and the achievement of the United Nations Sustainable Development Goals. Using a systematic literature review approach, the researchers examined whether AI applications adequately address the specific healthcare needs of women. Their findings indicated that although AI technologies have improved healthcare efficiency through enhanced diagnosis, data analysis, and decision-making, women's healthcare remains underrepresented in many AI-driven medical innovations. The study highlighted that the wider deployment of AI technologies could significantly improve access to healthcare services for women, especially those in underserved and rural communities. The authors therefore recommended increased attention to gendersensitive healthcare technologies and supportive policies that encourage the development of AI applications specifically tailored to women's health needs.

Bachina et al. (2024) explored the relationship between sustainable materials and the adoption of AI technologies in patient-centered healthcare systems. Using a multidisciplinary approach that combined life-cycle analysis and literature review, the researchers examined how eco-friendly materials could support the development of energy-efficient AI technologies used in healthcare. The findings revealed that while AI-driven healthcare solutions offer significant improvements in diagnosis, treatment planning, and patient monitoring, the increasing use of AI hardware and data storage systems raises concerns about energy consumption and environmental sustainability. The study suggested that adopting sustainable materials in the design of AI technologies can reduce carbon footprints and contribute to a more environmentally responsible healthcare system. In addition, the researchers noted that the integration of sustainable materials can enhance the longterm viability of AI-driven healthcare solutions while maintaining a patient-centered approach. Another study by Jung and Ko (2024) investigated the application of artificial intelligence in improving radiative cooling technologies used for sustainable thermal management. Radiative cooling is an emerging approach designed to regulate temperature and reduce energy consumption in buildings and other infrastructures. The authors explained that conventional radiative cooling systems often face design limitations and efficiency challenges. However, by integrating AI algorithms into the development and optimization of these systems, researchers can significantly improve their performance and adaptability. The study showed that AI can analyze complex thermal patterns, optimize cooling structures, and accelerate the development of more efficient cooling technologies. According to the authors, the integration of AI with radiative cooling technologies holds great promise for addressing global

environmental challenges such as rising temperatures and increasing energy demand. Liu et al. (2022) examined how AI-supported tools influence the teaching and learning processes in higher education. Using a comparative analysis of pre-test and post-test data, the study found that AI-assisted teaching models improved students' mastery of knowledge, enhanced skill development, and increased emotional engagement in learning activities. The authors observed that AI-enabled platforms allow teachers to monitor students' learning progress in real time and design more personalized instructional strategies, thereby improving teaching efficiency.

In a related study, Kazmaci et al. (2025) examined how teachers' knowledge, beliefs, and attitudes influence the sustainable integration of AI technologies in primary school classrooms. Based on data collected from 340 teachers and analyzed through structural equation modeling, the study found that teachers' attitudes toward AI play a crucial mediating role in determining whether they successfully integrate AI tools into teaching practices. Teachers who possess both theoretical knowledge and positive perceptions of AI were more likely to adopt AI-based instructional approaches.

Fteiha et al. (2025) assessed the readiness of teachers in the United Arab Emirates to adopt AI technologies in classroom environments. Their findings revealed that teachers' attitudes significantly influence the practical application of AI in teaching, while knowledge contributes indirectly through its effect on attitudes. The study emphasized the importance of professional development programs that equip teachers with both technological skills and confidence in using AI tools.

Focusing specifically on Nigeria, Ayanwale et al. (2025) investigated factors influencing teachers' adoption of large language models such as ChatGPT. The study revealed that perceived usefulness, perceived ease of use, and social influence significantly predict teachers' intention to use AI technologies. However, challenges such as technological anxiety, limited infrastructure, and concerns about privacy were identified as barriers to effective adoption.

Ngo et al. (2025) explored university students' intentions to adopt large language models for learning. Using the Technology Acceptance Model and the Theory of Planned Behaviour, the study found that students' attitudes, perceived usefulness, and social influences significantly determine their willingness to adopt AI technologies in academic activities.

Conclusion

Artificial Intelligence represents a transformative technological innovation capable of enhancing the quality and effectiveness of vocational education in Nigeria. Through intelligent tutoring systems, adaptive learning platforms, virtual simulations, and automated assessment tools, AI can improve teaching methods, learner engagement, and skill acquisition. However, the successful integration of AI into vocational education requires strategic investments in digital infrastructure, teacher capacity building, curriculum reform, and inclusive educational policies. If properly implemented, AI-enhanced vocational education can strengthen human capital development, improve employability, stimulate innovation, and support sustainable development in Nigeria.

References

Ayanwale, M. A., Adelana, O. P., Bamiro, N. B., Olatunbosun, S. O., Idowu, K. O., & Adewale, K. A. (2025). Large language models and GenAI in education: Insights from Nigerian inservice teachers through a hybrid ANN-PLS-SEM approach. F1000Research, 14, 258. https://doi.org/

Bachina, L., Kanagala, A., Korapu, S., & Ratnaraju, P. (2024). Sustainable materials for artificial intelligence technology adoption for energy-efficient patient-centric healthcare solutions. Journal of Education and Health

Promotion. 3(2), 45 56

Becker, G. S. (1993). Human capital: A theoretical and empirical analysis with special reference to education (3rd ed.). University of Chicago Press.

Bibri, S. E., Alexandre, A., Sharifi, A., & Krogstie, J. (2023). Environmentally sustainable smart cities and their converging AI, IoT, and big data technologies and solutions: An integrated approach to an extensive literature review. Energy Informatics, 6(1), 9. https://doi.org/

Bibri, S. E., Huang, J., Jagatheesaperumal, S. K., & Krogstie, J. (2024). The synergistic interplay of artificial intelligence and digital twin in environmentally planning sustainable smart cities: A comprehensive systematic review. *Environmental Science and Ecotechnology, 20, 100433. https://doi.org/

Brynjolfsson, E., & McAfee, A. (2017). The second machine age: Work, progress, and prosperity in a time of brilliant technologies. W. W. Norton & Company.

Bukowski, L., & Werbinska-Wojciechowska, S. (2025). Towards Maintenance 5.0: Resiliencebased maintenance in AI-driven sustainable and human-centric industrial systems. Sustainability, 25(16), 5100. https://doi.org/

Fteiha, M., Al-Rashaida, M., & Ghazal, M. (2025). General and special education teachers' readiness for artificial intelligence in classrooms. PLoS ONE, 20(9), e0331941.

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.

Jung, Y., & Ko, S. H. (2024). Radiative cooling technology with artificial intelligence. iScience, 27(12), 111325. https://doi.org/10.1016/j.

Kazmaci, A., Cek, K., Altinay, F., Altinay, Z., & Dagli, G. (2025). Influence of theoretical and practical artificial intelligence knowledge on primary school teachers' sustainable AI integration ability. Frontiers in Psychology, 16, 1628557.

Kazmaci, A., Cek, K., Altinay, F., Altinay, Z., & Dagli, G. (2025). Influence of theoretical and practical artificial intelligence knowledge on the primary school teachers' sustainable AI integration ability: Mediating effects of beliefs and attitudes. Frontiers in Psychology, 16, 1628557. https://doi.org/

Lau, P. L., Nandy, M., & Chakraborty, S. (2023). Accelerating UN sustainable development goals with AI-driven technologies: A systematic literature review of women's healthcare. Healthcare, 11(3), 401. https://doi.org/10.3390/

Liu, Y., Chen, L., & Yao, Z. (2022). The application of artificial intelligence assistant to deep learning in teachers' teaching and students' learning processes. Frontiers in Psychology, 13, 929175. https://doi.org/10.3389/fpsyg.2022.929175

Ngo, T. T. A., Vo, T. T. A., & Phan, M. T. (2025). The psychology of AI adoption in education: University students' intentions to use large language models for learning from a TAM and TPB perspective. Acta Psychologica, 261, 105789. https://doi.org/10.1016/

OECD. (2024). Education and AI: Preparing human capital for the future. OECD Publishing.

Okoye, K. R. E., & Arimonu, M. O. (2016). Technical and vocational education in Nigeria: Issues, challenges and a way forward. Journal of Education and Practice, 7(3), 113-118.

Russell, S., & Norvig, P. (2021). Artificial intelligence: A modern approach (4th ed.). Pearson.

UNESCO. (2016). Strategy for technical and vocational education and training (TVET) 2016-2021. UNESCO.

UNESCO. (2017). Education for sustainable development goals: Learning objectives.

UNESCO.

UNESCO. (2021). Artificial intelligence in education: A guide for policymakers. UNESCO Publishing.

World Commission on Environment and Development. (1987). Our common future. Oxford University Press.