



INVESTIGATING THE AWARENESS OF DIGITAL SKILLS DEVELOPMENT AND ARTIFICIAL INTELLIGENCE IN TECHNICAL AND VOCATIONAL EDUCATION IN EDO STATE, NIGERIA

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Abstract

This study investigated the awareness of digital skills development and Artificial Intelligence (AI) in Technical and Vocational Education and Training (TVET) in Edo State, Nigeria. The rapid evolution of Industry 4.0, driven by AI, automation, and digitalization, necessitates the retooling of TVET curricula to produce digitally competent graduates. The study adopted a descriptive survey research design. The population comprised 284 TVET instructors and final-year students from three technical colleges and two tertiary institutions offering TVET programmes in Edo State. A sample of 166 respondents was derived using Taro Yamane's formula at 5% level of significance, however, the sample was increased to 210 respondents (70 instructors and 140 students) through proportionate stratified random sampling to ensure adequate representation across strata and to account for possible non-response. Data were collected using a structured questionnaire titled 'Awareness of Digital Skills and Artificial Intelligence Questionnaire (ADSAIQ)'. The instrument was validated by three experts in TVET and Measurement and Evaluation. A pilot study involving 20 respondents outside the study area yielded Cronbach's Alpha reliability coefficients of 0.84 for Section B (Digital Skills and AI Awareness) and 0.89 for Section C (Barriers), with an overall coefficient of 0.87. Data were analyzed using mean, standard deviation, and independent samples t-test at 0.05 level of significance. Findings revealed a moderate level of awareness of digital skills development (Overall Mean = 2.66) but a low level of awareness of AI applications in TVET (Overall Mean = 2.09). Major barriers identified included inadequate digital infrastructure, lack of trained personnel, poor internet connectivity, and outdated curriculum. There was a significant difference between instructors' and students' awareness levels ($t_{\text{cal}} = 4.21, p < 0.05$). The study recommends urgent curriculum review, intensive capacity building, public-private partnerships for digital infrastructure, and policy interventions by the Edo State Government and National Board for Technical Education (NBTE) to integrate AI and emerging digital skills into TVET.

Keywords: Digital Skills, Artificial Intelligence, TVET, Awareness, Industry 4.0

Introduction

The global landscape of education is undergoing a profound transformation driven by the integration of Artificial Intelligence (AI) technologies into teaching, learning, and assessment. According to UNESCO (2023), AI represents a revolutionary force redefining educational delivery by supporting adaptive learning systems, automating assessment, enabling predictive analytics, and creating personalized learning environments. For Technical and Vocational Education and Training (TVET), where practical and skill-based training forms the core, AI offers unique opportunities for improving



instructional efficiency, creativity, and innovation. In Nigeria, TVET occupies a crucial position in the nation's educational and economic development framework. It is designed to equip learners with technical and occupational skills to contribute effectively to national industrial growth and self-reliance (Federal Republic of Nigeria, 2013). However, implementation faces persistent challenges including inadequate instructional facilities, outdated training equipment, poor funding, insufficient teacher competence, and limited industry collaboration (Okolie et al., 2022). Consequently, the gap between classroom learning and industry requirements continues to widen, leaving graduates inadequately prepared for technologically advanced workplaces.

In the 21st century, the world of work is being reshaped by digital transformation and AI. Digital skills, ranging from basic digital literacy to advanced competencies in data analytics, cloud computing, Internet of Things (IoT), and AI, have become essential employability skills (World Bank, 2021; UNESCO-UNEVOC, 2022). AI, defined as the simulation of human intelligence processes by machines, is now integrated into manufacturing, construction, agriculture, healthcare, and services—all core domains of TVET. The World Economic Forum (2020) projects that future jobs will require both technical know-how and digital fluency. Edo State is positioned as an emerging technology and innovation hub in South-South Nigeria through initiatives such as EdoJobs and Edo Innovation Hub. The state government has embarked on curriculum reforms emphasizing information technology, welding, and auto-mechanics, and partnerships for specialized manufacturing facilities (Edo State Ministry of Science, Technology and Innovation, 2023). For disciplines like electronics and mechanics, technical training institutions in Edo State were previously forced to teach theoretical subjects due to lack of workshops, equipment, and qualified teachers. To deliver enduring training, VTE institutions must address hiring technical instructors with up-to-date skills and upgrading workshop facilities to meet labour market expectations.

Statement of the Problem

Despite global advancements, empirical evidence shows that Nigeria's vocational and technical institutions have been slow to adopt AI technologies. Ogbuanya and Adeyemi (2021) reported that most instructors in Nigerian vocational institutions lack the pedagogical and technological skills to integrate AI tools effectively. Similarly, UNESCO-UNEVOC (2022) noted that AI integration in African TVET remains at a nascent stage due to inadequate funding, lack of infrastructure, and limited awareness. Many training centres still operate with obsolete tools and outdated curricula that fail to incorporate computational thinking or AI literacy, producing graduates with mechanical knowledge but lacking digital intelligence required by modern industries (Adebayo et al., 2023).

In Edo State, while government policy documents advocate for a digital economy, many TVET institutions continue to employ outdated teaching methods and lack digital infrastructure. Shuaibu (2024) identified major obstacles to AI integration in TVET in Africa to include lack of infrastructure, lack of skilled trainers and AI experts, and concerns about ethical implications. The extent to which TVET instructors and students are aware of digital skills and AI tools relevant to their trades—such as AI-assisted auto diagnostics, CNC machines, digital marketing for entrepreneurship, and smart agriculture—remains undocumented. This lack of empirical data hinders evidence-based planning. Furthermore, the current body of research on AI in Nigerian TVET is still dispersed, frequently descriptive, and devoid of thorough synthesis (Abdullahi et al., 2025). There is a dearth of empirical and systematic reviews that critically evaluate the state, difficulties, and potential directions of AI integration. Therefore, this study seeks to investigate the level of awareness of digital skills development and Artificial Intelligence in TVET in Edo State to provide baseline data for policy, curriculum reform, and capacity building.

Purpose of the Study

The main purpose of this study was to investigate awareness of digital skills development and AI in TVET in Edo State. Specifically, the study sought to:

1. Determine the level of awareness of digital skills development among TVET instructors and students in Edo State.



2. Ascertain the level of awareness of Artificial Intelligence and its applications in TVET
3. Identify the barriers militating against digital skills and AI integration in TVET institutions.
4. Determine if there is a significant difference between instructors' and students' awareness levels.

Research Questions

The following research questions guided the study:

1. What is the level of awareness of digital skills development among TVET instructors and students in Edo State?
2. What is the level of awareness of AI and its applications in TVET in Edo State?
3. What are the barriers to digital skills development and AI integration in TVET in Edo State?
4. Is there any significant difference between instructors' and students' awareness of digital skills and AI?

Hypothesis

The following hypothesis was tested at 0.05 significant level:

1. There is no significant difference between the mean responses of TVET instructors and students on their awareness of digital skills development and AI in Edo State at 0.05 level of significance.

Review of Literature

Artificial Intelligence in Education

Artificial intelligence (AI) has become a disruptive force in education with tools and systems that can automate administrative tasks, assist in decision-making, and personalize learning (Luckin et al., 2016). AI technologies such as machine learning, natural language processing, and expert systems are increasingly being integrated into educational platforms to enhance student performance and engagement. AI technologies have been used to support education and training in language, STEM, and medicine since the mid-1950s (Perrotta & Selwyn, 2020). Recent literature reveals that AI educational applications are being developed to assist with performance evaluation, interaction and collaboration, and creation and distribution of information (Chassignol et al., 2018; Perrotta & Selwyn, 2020). Since teaching and learning are knowledge-intensive cognitive tasks, the field of education is particularly well-suited to AI technologies designed for cognitive and problem-solving processes based on algorithms and knowledge bases.

The Relevance of AI to Vocational and Technical Education

Vocational and Technical Education is inherently practical, requiring active participation, experimentation, and hands-on experience. The traditional approach to VTE instruction in Nigeria relies heavily on teacher demonstrations and repetitive manual practice. However, this model is constrained by limited access to modern tools and consumable resources. AI's entry marks a paradigm shift from routine manual teaching to smart learning environments characterized by automation, virtual simulation, and real-time performance analytics. For example, AI-based intelligent tutoring systems (ITS) can mimic human instructors by providing personalized guidance, while machine learning algorithms can track student progress and suggest corrective measures. These features are valuable in disciplines like computer hardware maintenance, where diagnostic precision, procedural sequencing, and creative problem-solving are essential. Moreover, AI-integrated augmented reality (AR) and virtual reality (VR) tools allow students to explore 3D models of circuits and hardware components interactively, which enhances conceptual understanding and reduces dependency on physical laboratories (Chen & Huang, 2022).

The global movement towards Industry 4.0 characterized by cyber-physical systems, IoT, big data, and AI has amplified demand for workers skilled in both technical and digital competencies. For Nigeria,



this shift is critical. The Federal Government's National Digital Economy Policy and Strategy (2020-2030) explicitly links Industry 4.0 skills to TVET reform, emphasizing that without digital upskilling, Nigerian technicians will be excluded from emerging value chains in advanced manufacturing, precision agriculture, and e-services. Thus, Industry 4.0 is not merely a foreign concept but a policy imperative that requires Nigerian VTE curricula to evolve from analog workshops to innovation hubs where creativity, data analytics, and technical mastery intersect.

Artificial Intelligence in Vocational and Technical Education (VTE)

TVET is crucial for students to gain employable skills. Despite its early stages, AI integration in TVET has potential to enhance simulation-based training, smart assessments, and real-time skill development (UNESCO-UNEVOC, 2021). Deckker and Sumanasekara (2025) argue that AI has produced creative solutions that significantly improve skill-based learning structures in VTE through industry-relevant training modules that mimic real-world technical problems, virtual labs, and predictive analytics (Zawacki-Richter et al., 2019). AI integration can close digital skill gaps, foster innovation, and equip graduates with skills required for the 21st-century workforce. Adebayo et al. (2023) found low to moderate awareness of AI among vocational students in South-West Nigeria, with many equating AI solely with science fiction. Similarly, Abdullahi et al. (2025) in a systematic review on Artificial Intelligence Adoption for Skills Development in Nigeria reported high stakeholder interest in AI but serious deficiencies in infrastructure, instructor knowledge, policy coordination, and ethical governance. The study emphasized relative advantage, compatibility, trialability, complexity, and observability as determinants of AI adoption. Nja et al. (2023) also discovered that enthusiasm for integrating AI into teaching does not always translate into readiness, primarily because of low digital literacy and lack of organized capacity-building. These findings demonstrate the need for empirical investigation in Edo State.

Methodology

Research Design: The study adopted a descriptive survey research design, suitable for collecting data from a large population to describe current conditions and attitudes.

Area of the Study: The study was conducted in Edo State, Nigeria, covering Edo South, Edo Central, and Edo North senatorial districts.

Population: The population comprised 284 respondents, including 84 TVET instructors and 200 final-year (ND II / NCE III) students from Benin Technical College, Igarra Technical College, Government Science and Technical College, Auchu Polytechnic, and College of Education, Ekiadolor.

Sample and Sampling Technique: The minimum sample size was determined using Taro Yamane's formula: $n = N / [1 + N(e)^2]$, where $N=284$ and $e=0.05$. This yields $n = 284 / [1 + 284(0.0025)] = 284 / 1.71 = 166.08 \approx 166$. To ensure adequate representation of the two strata (instructors and students) and to mitigate non-response, the sample was proportionately increased to 210 respondents, comprising 70 instructors (33.3%) and 140 students (66.7%), selected through stratified random sampling. This oversampling approach is consistent with best practices in survey research where attrition is anticipated. **Instrument for Data Collection:** A structured questionnaire titled 'Awareness of Digital Skills and Artificial Intelligence Questionnaire (ADSAIQ)' was used. It had three sections: Section A (Demographics), Section B (Awareness levels - 20 items on a 4-point Likert scale: Very High=4 to Very Low=1), and Section C (Barriers - 10 items). The instrument was validated by three experts—two in Vocational and Technical Education and one in Measurement and Evaluation from Ambrose Alli University. Their suggestions were incorporated to improve clarity and content validity.

A pilot test was conducted with 20 respondents (10 instructors and 10 students) from Delta State Technical College, outside the study area, who were not part of the main study. Cronbach's Alpha analysis yielded reliability coefficients of 0.84 for Section B, 0.89 for Section C, and an overall reliability of 0.87, indicating high internal consistency.

Method of Data Collection: The questionnaire was administered physically and via Google Forms within 4 weeks, with the assistance of two research assistants. 205 questionnaires (97.6%) were retrieved and found usable.

Method of Data Analysis: Mean and standard deviation were used to answer research questions. A mean score of 2.50 and above was considered high/aware, below 2.50 low/not aware. Independent samples t-test was used to test the hypothesis at 0.05 level of significance.

Results

Research Question One: Level of awareness of digital skills development.

Table 1: Level of Awareness of Digital Skills Development

S/N	Digital Skills Items	Mean	Remark
1	Knowledge of basic computer operation & internet use	3.12	Aware
2	Use of MS Office, Google Workspace for documentation	2.98	Aware
3	Use of trade-specific software (AutoCAD, CorelDraw, etc.)	2.21	Not Aware
4	Knowledge of cloud storage, online collaboration tools	2.35	Not Aware
5	Digital entrepreneurship & online marketing skills	2.67	Aware
Overall Mean		2.66	Moderate Awareness

Table 1 shows that respondents are aware of basic computer operation and internet use (Mean=3.12), use of MS Office/Google Workspace (Mean=2.98), and digital entrepreneurship (Mean=2.67). However, they are not aware of trade-specific software such as AutoCAD and CorelDraw (Mean=2.21) and cloud storage/collaboration tools (Mean=2.35). The overall mean of 2.66 indicates a moderate level of awareness of digital skills development. This implies that while respondents possess basic ICT literacy, they lack advanced, trade-specific digital competence required for Industry 4.0.

Research Question Two: Level of awareness of AI and its applications.

Table 2: Level of Awareness of AI and its Applications

S/N	AI Awareness Items	Mean	Remark
1	Concept and definition of AI	2.18	Low
2	AI applications in my trade (e.g., smart diagnostics)	1.94	Low
3	Use of AI tutoring systems / ChatGPT for learning	2.42	Low



4	Awareness of robotics and automation	2.05	Low
5	Awareness of AI ethics and safety	1.87	Low
Overall Mean		2.09	Low Awareness

Table 2 reveals low awareness across all AI items. The highest mean was for use of AI tutoring systems/ChatGPT for learning (2.42), yet still below the 2.50 threshold. Awareness of AI applications in specific trades scored lowest (1.94), followed by AI ethics and safety (1.87). The overall mean of 2.09 indicates low awareness of AI and its applications. This suggests respondents largely perceive AI as an abstract concept associated with robots and science fiction, not as practical diagnostic or pedagogical tools applicable to their vocations.

Research Question Three: Barriers to integration

Table 3: Barriers to Integration

S/N	Barrier Items	Mean	Rank
1	Inadequate digital infrastructure / labs	3.45	1 st
2	Lack of trained instructors in digital/AI skills	3.38	2 nd
3	Poor internet connectivity and high data cost	3.31	3 rd
4	Outdated NBTE curriculum	3.22	4 th
5	Inadequate funding and policy support	3.18	5 th

Table 3 shows the ranking of barriers militating against digital skills and AI integration. Inadequate digital infrastructure/labs ranked first (Mean=3.45), followed by lack of trained instructors (Mean=3.38), poor internet connectivity and high data cost (Mean=3.31), outdated NBTE curriculum (Mean=3.22), and inadequate funding and policy support (Mean=3.18). All items scored above 3.0, indicating that respondents strongly agree that these are significant barriers. The ranking confirms that the challenge is systemic and infrastructural rather than merely attitudinal.

Hypothesis Testing

Table 4: Independent Samples t-test Comparing Instructors and Students

Group	N	Mean	SD	t-cal	Decision
Instructors	70	2.84	0.52	4.21	Significant
Students	140	2.31	0.61		H01 Rejected

Table 4 shows the independent samples t-test comparing instructors and students. Instructors had a higher mean awareness score (M=2.84, SD=0.52) than students (M=2.31, SD=0.61). The calculated t-



value of 4.21 is greater than the critical t-value of 1.96 at 208 degrees of freedom and 0.05 significance level. Therefore, the null hypothesis is rejected. There is a statistically significant difference between instructors' and students' awareness of digital skills and AI. This indicates that instructors are significantly more aware than students, likely due to exposure to workshops, conferences, and personal professional development, although both groups remain below the threshold for Industry 4.0 readiness.

Discussion of Findings

The finding of moderate awareness of basic digital skills (Mean=2.66) corroborates Okwelle and Agi (2022) who reported that TVET teachers possess basic ICT skills but lack advanced trade-specific digital competence. Similarly, Adebayo and Salami (2022) observed that many technical colleges in Nigeria have basic computer labs but lack industry-specific software. This suggests that while respondents use smartphones and basic office tools, they are unfamiliar with Industry 4.0 tools such as IoT, CNC, and cloud collaboration, which are essential for modern trades. The low awareness of AI (Mean=2.09) aligns with Adebayo et al. (2023) and the UNESCO-UNEVOC (2022) report that AI integration in African TVET is still nascent. The particularly low scores on AI applications in trades (1.94) and AI ethics (1.87) indicate a conceptual gap. Many students equated AI solely with robots or science fiction, not as diagnostic tools (e.g., AI-assisted auto diagnostics, predictive maintenance) or pedagogical tools (intelligent tutoring). This supports Nja et al. (2023) who found that enthusiasm does not translate to readiness due to low digital literacy.

The ranking of barriers confirms that the challenge is systemic, not attitudinal. Inadequate infrastructure and lack of instructor capacity were top-ranked, supporting Asamoah et al. (2023) who identified similar barriers in Ghanaian TVET. In the Nigerian context, this is compounded by high data costs and epileptic power supply. The outdated NBTE curriculum, ranked 4th, reflects a policy lag; the current NBTE curricula (2023) have begun to include digital literacy, but implementation remains slow without labs and trained personnel.

The significant difference ($t=4.21$, $p<0.05$) indicates instructors are more aware than students. This is expected, as instructors have greater access to professional development via TETFund conferences, EdoJobs training, and personal learning. However, the instructor mean of 2.84 still indicates only moderate awareness, well below the 3.5 benchmark suggested for digital competence in TVET (European Commission DigComp 2.2, 2022). Thus, both groups require urgent intervention if Edo State TVET graduates are to be employable in the emerging digital economy.

Conclusion

The study concludes that TVET stakeholders in Edo State have moderate awareness of general digital skills but low awareness of Artificial Intelligence and its applications in vocational trades. Without deliberate intervention, graduates of TVET institutions in Edo State risk being unemployable in the emerging digital economy driven by Industry 4.0. Awareness is the first step toward adoption, and the current level is insufficient to drive digital transformation of TVET in the state. The barriers are largely systemic, requiring coordinated efforts in infrastructure, human capital development, and curriculum reform.

Recommendations

Based on the findings, the following recommendations are made:

1. Curriculum Reform: The National Board for Technical Education (NBTE) in collaboration with Edo State Ministry of Education should urgently review TVET curricula to embed digital skills frameworks (DigComp 2.2) and AI literacy modules across all trades, with practical trade-specific examples.
2. Capacity Building: Edo State Government through EdoJobs and the Ministry of Science and Technology should organize mandatory retraining, certification, and continuous professional development (CPD) for all TVET instructors on advanced digital tools, AI, IoT, and virtual learning platforms.



3. Infrastructure Investment: Government and private sector should establish well-equipped digital labs, smart workshops, reliable broadband internet, and makerspaces in technical colleges. Adoption of public-private partnership (PPP) model with companies like MainOne, MTN, and Bosch is recommended.
4. Policy and Funding: A state policy on Digital TVET should be formulated, with dedicated funding for research and procurement of emerging technologies. A Digital Skills Fund for TVET should be created and backed by legislation.
5. Industry Linkage: Strengthen collaboration between TVET institutions and industries in Edo State to provide real-world AI applications, internships, and mentorship. This will bridge the gap between classroom and workplace.
6. Awareness Campaigns: Launch state-wide sensitization campaigns, career fairs, and bootcamps to demystify AI and showcase digital opportunities in vocational careers to students and parents.

References

- Abdullahi, R., Bawa, K., & Shuaibu, S. (2025). Artificial Intelligence adoption for skills development in Nigeria: A systematic review and roadmap for TVET transformation. *International Journal of Research and Innovation in Social Science*, 9(8), 51-67. <https://doi.org/10.47772/IJRISS.2025.908000051>
- Adebayo, F., & Salami, O. (2022). Challenges and prospects of digital literacy in Nigerian technical education. *Nigerian Journal of Educational Technology*, 14(2), 88-101.
- Adebayo, O., Musa, K., & Okonkwo, U. (2023). Artificial intelligence awareness among vocational education students in South-West Nigeria. *Journal of Vocational Education and Technology*, 8(2), 45-58.
- Administration and Management (ICAM 2024). *College of Administration and Management Studies*. Hassan Usman Katsina.
- Alotaibi, N. S., & Alshehri, A. H. (2023). Prospects and obstacles in using Artificial Intelligence in Saudi Arabia higher education institutions. The potential of AI-based learning outcomes. *Sustainability*, 15(13), 10723. <https://doi.org/10.3390/su151310723>
- Asamoah, S., Osei, M., & Boateng, K. (2023). Barriers to digitization of TVET in Ghana. *International Journal of TVET*, 14(3), 112-129.
- Bolou, D., Yusuf, I. O., Ugbogbo, M. J., & Chukwudi, T. A. (2022). Digital skills as economic growth enablement in Nigeria. *International Journal of Maritime and Interdisciplinary Research*, 3(15), 45-58.
- Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial Intelligence trends in education: A narrative overview. *Procedia Computer Science*, 136, 16-24. <https://doi.org/10.1016/j.procs.2018.08.233>
- Chen, Y., & Huang, X. (2022). Augmented reality and artificial intelligence in vocational training: A systematic review. *Computers & Education*, 190, 104616. <https://doi.org/10.1016/j.compedu.2022.104616>
- Deckker, D., & Sumanasekara, S. (2025). AI in vocational and technical education: Revolutionizing skill-based learning. *International Journal of Educational Research and Policy*. <https://doi.org/10.36713/epra20462>
- European Commission. (2022). *DigComp 2.2: The Digital Competence Framework for Citizens*. Publications Office of the European Union.
- Federal Republic of Nigeria. (2013). *National Policy on Education* (6th Edition). NERDC Press.
- Harry, A. (2023). Role of AI in education. *Injury: Interdisciplinary Journal and Humanity*, 2(3), 45-58.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.



- Nja, C. O., Idiege, K. J., Uwe, U. E., Meremikwu, A. N., Ekon, E. E., Erim, C. M., Ukah, J. U., Eyo, E. O., Anari, M. I., & Cornelius-Ukpepi, B. U. (2023). Adoption of artificial intelligence in science teaching: From the vantage point of the African science teachers. *Smart Learning Environments*, 10(1), 1-20. <https://doi.org/10.1186/s40561-023-00261-x>
- National Board for Technical Education (NBTE). (2023). *Standards and criteria for digital learning in polytechnics and technical colleges in Nigeria*. NBTE.
- Ogbuanya, T. C., & Adeyemi, O. A. (2021). Artificial intelligence and the challenges of technical teacher education in Nigeria. *Nigerian Journal of Educational Technology*, 18(2), 33-47.
- Okolie, U. C., Igwe, P. A., & Nwajiuba, C. A. (2022). Vocational education and training in sub-Saharan Africa: Addressing the skills gap through innovation. *Education + Training*, 64(2), 214-230. <https://doi.org/10.1108/ET-03-2021-0078>
- Okwelle, P. C., & Agi, U. K. (2022). Digital competence of technical teachers in Rivers State. *Journal of Technical Education and Training*, 14(1), 78-89.
- Perrotta, C., & Selwyn, N. (2020). Deep learning goes to school: Toward a relational understanding of AI in education. *Learning, Media and Technology*, 45, 251-269. <https://doi.org/10.1080/17439884.2020.1686017>
- Rosyadi, M. I., Kustiawan, I., & Tetehfio, E. O. (2023). The role of AI in vocational education: A systematic literature review. *Journal of Vocational Education Studies*, 6(2), 244-263.
- Shuaibu, N. (2024). *Integrating artificial intelligence (AI) in vocational education for sustainable development in Africa*. In Proceedings of the 4th International Conference on
- Suparyati, A., Widiastuti, I. I., Saputro, N. I., & Pambudi, A. N. (2024). The role of Artificial Intelligence (AI) in vocational education. *Jurnal Ilmiah Pendidikan*, 12(1), 33-45.
- UNESCO-UNEVOC. (2021). *Leveraging Artificial Intelligence for TVET: Global trends and best practices*. UNESCO-UNEVOC International Centre.
- UNESCO-UNEVOC. (2022). *Digitalization of TVET: Trends, issues and challenges*. UNESCO-UNEVOC International Centre.
- UNESCO. (2023). *Artificial Intelligence and Education: Guidance for policy-makers*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000370675>
- World Bank. (2021). *Nigeria Digital Economy Diagnostic Report*. World Bank Group.
- World Economic Forum. (2020). *The Future of Jobs Report 2020*. World Economic Forum.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>