© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723021

Assessment of Vocational Training Centres Facilities in Oyo State

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Abstract- ***Technical and Vocational Education and Training (TVET) plays a vital role in developing practical skills, improving employability, and promoting socio-economic development. However, inadequate facilities, poor infrastructure, limited technological resources, and maintenance challenges continue to affect the effectiveness of vocational training in Nigeria. This study assessed the facilities and architectural conditions of selected Vocational Training Centres (VTCs) in Oyo State. A mixed-method research design was adopted, using questionnaires, physical observations, site assessments, photographic documentation, and case studies.***

Multistage sampling was used to select four VTCs from eight identified centres, involving 162 trainees and 8 tutors. Data were analysed using frequencies, percentages, Average Weighted Value (AWV), Mean Weighted Value (MWV), Relative Importance Index (RII), cross-tabulation, chi-square, and thematic analysis. Findings revealed inadequate provision of key facilities, particularly workshops (MWV = 2.74), training equipment (2.61), ICT laboratories (2.48), water supply (2.29), sanitation (2.18), power supply (1.96), and safety facilities (1.88). Respondents strongly preferred standard workshops (91.6%), ICT laboratories (89.0%), smart classrooms (85.2%), and integrated theoretical and practical learning environments (72.3%). Natural lighting and ventilation (RII = 0.80) and renewable energy systems (RII = 0.78) were also identified as important design considerations. The study concludes that existing VTCs require improved infrastructure, modern equipment, technological integration, sustainable design, and effective maintenance. It recommends the development of flexible, user-centred, technology-driven, and environmentally sustainable vocational training facilities to enhance practical skill acquisition and support workforce development in Ogbomoso and Oyo State.

Keywords: Vocational Training Centres, TVET, Architectural Design, Facilities, Sustainable Design.

I. INTRODUCTION

Technical and Vocational Education and Training (TVET) plays a vital role in providing individuals with relevant practical skills, knowledge, and attitudes necessary for employment, productivity, and self-reliance. It encompasses education and training that prepares learners for specific trades, occupations, and careers that require technical or practical competencies (Atchoereria & Delluc, 2021). As emphasized by UNESCO (2006), TVET is fundamental to driving economic competitiveness, fostering social inclusion, reducing poverty, and enabling sustainable development. Through structured instruction, workshops, and apprenticeships, TVET equips learners with job-ready competencies suitable for both industrial work and entrepreneurship.

In Nigeria, the relevance of TVET has gained increasing recognition as the population continues to face challenges of unemployment, poverty, and inadequate skilled manpower. Societal interest in vocational learning has expanded due to technological advancement and the need to revise curricula, methodologies, and facilities to meet current industry standards (Oguntuyi, 2018). TVET was positioned to stimulate entrepreneurial capacity, promote wealth creation, and support national economic advancement (Tiamiyu & Babalola, 2013; Oladejo, 2019). Its graduates are expected to possess market-driven competencies that will enable them to secure employment or establish sustainable livelihoods (Obidile, 2018).

To tackle unemployment and poverty, several national intervention agencies have been established, including the National Directorate of Employment (NDE), National Poverty Eradication Programme (NAPEP) as well as Youth Economic Advancement Programme (YEAP), among others (Egunyomi & Okora, 2020).

These programmes align with global development goals such as the United Nations Millennium Development Goals (MDGs), particularly the eradication of extreme poverty and hunger. However, individuals lacking employable skills are often unable to benefit from these initiatives, thereby underscoring the importance of vocational training in empowering the youth and vulnerable populations (World Bank, 2011).

Despite its recognized importance, the Nigerian TVET system continues to face persistent challenges which hinders skill acquisition and reduce the quality of graduates entering the labour market. Consequently, many TVET institutions struggle to achieve programme objectives, and their outputs often fail to meet market expectations. Evidence from similar contexts highlights these challenges. For instance, Kakamega County in Kenya reported inadequate funding, poor institutional capacity, and low skill acquisition rates among trainees, ultimately affecting graduate employability (Kakamega County Education Task Force Report, 2017). Such problems underscore the need for systematic assessment of vocational training centres to understand constraints and identify opportunities for improvement.

In Oyo State, vocational training centres are expected to serve as platforms for developing relevant skills for industrial growth and local entrepreneurship, especially in emerging urban centres like Ogbomoso. The city's growing youth population, coupled with limited formal employment, heightens demand for practical, skill-oriented education. Yet, there is limited empirical assessment of the adequacy, functionality, and effectiveness of existing vocational training centres across the state. Issues relating to infrastructure, accessibility, workshop design, curriculum relevance, and staffing conditions remain largely undocumented. Without understanding these elements, attempts to improve facilities or design new centres may not effectively address existing gaps.

Therefore, assessing the condition and performance of vocational training centres in Oyo State is essential to guide informed planning and design interventions. Such assessment will help determine the adequacy of physical facilities, capacity for training delivery, and readiness for skill development. The findings are expected to contribute toward improving skill acquisition, enhancing employability, and promoting sustainable socio-economic development in Oyo State.

II. LITERATURE REVIEW

The terms vocational education and technical education are often used interchangeably, yet they are not entirely synonymous. According to Nwadioha (2019), vocational education is a subset of technical education, with a sharper focus on practical skill acquisition and functional knowledge required for entry into trades, occupations, or specific employment opportunities. Technical education, on the other hand, provides broader applied skills combined with scientific knowledge needed to develop a technically competent workforce for national development.

Several scholars, including Olagbegi (2015), Oluwalola (2018), Osayomuanbor and Edokpayi (2018) and Ezennia (2022), similarly conceptualize vocational and technical education as education designed to prepare individuals for gainful employment in specific occupations. Osuala (2024) further emphasizes that vocational education, whether in schools or public training environments, equips learners with practical and applied competencies, enabling them to function effectively in the labour market. This perspective aligns with the National Policy on Education (2024), which describes Technical and Vocational Education (TVE) as an educational process involving general studies, applied sciences, technology, and practical skills development, aimed at supporting economic and social sectors of the country.

From an architectural perspective, vocational training centres require careful planning to effectively support both theoretical and practical learning. Shaheen (2017) explains that VTCs, particularly workshops, must strike a balance between functional, technical, and environmental requirements. The design phase is therefore a critical stage in the life cycle of vocational facilities, involving the development of spaces that satisfy safety, operational efficiency, durability, aesthetics, and the psychological and social needs of users (Barrie & Paulson, 2012). Effective communication between educational planners,

instructors, and architects helps define design requirements that enhance teaching and learning (Department of Public Instruction, 2012).

2.1 Historical Development of Vocational Education and Training (VET) in Nigeria

The history of Vocational Education and Training (VET) in Nigeria can be traced to indigenous apprenticeship and craftsmanship systems that existed before colonial influence. Formal vocational training began in 1856 with the establishment of an institution in Abeokuta offering training in brickmaking, tie-dye, printing, and carpentry. This was followed by institutions such as the Hope Waddell Training Institute in Calabar and Nassarawa School, which expanded training in carpentry, tailoring, agriculture, weaving, leatherwork, and other practical skills (Peretomode, 2021; Akpan et al., 2021).

The development of technical education accelerated in the 1930s following E.R.J. Hussey's advocacy for technical training, leading to the establishment of Yaba Higher College in 1932. After World War II, craft centres expanded across Nigeria, while the University of Nigeria, Nsukka introduced vocational-technical education programmes in 1960 (Akpan et al., 2021).

Despite the growing demand for specialised skills due to technological advancement, trade liberalisation, and industrial changes, university education has remained socially preferred over vocational pathways. This has contributed to a shortage of locally skilled vocational workers and increased reliance on foreign professionals (Yang, 2008; Oranu, 2010; Ojimba, 2012). The effectiveness of VET also depends on the quality of its physical, social, and psychological learning environments, which influence skill acquisition, employability, productivity, and human resource development (Dokubo, 2010).

2.1.1 Types of Vocational Training Centres

Vocational training centres can be broadly classified into informal and formal centres. Informal training is usually conducted in workshops or shops, where trainees acquire practical skills such as tailoring, carpentry, hairdressing, and mechanical repairs through direct supervision and hands-on experience (Arroyo, 2020). Formal vocational centres operate within established educational structures, combining theoretical instruction with practical training in classrooms, laboratories, and workshops (Seyfried & Pohlenz, 2018).

2.2 Architectural Standards for Vocational Training Facilities

Architectural standards are essential in creating vocational learning environments that support skill acquisition, safety, comfort, health, security, social interaction, and psychological well-being. Educational spaces influence learning, behaviour, productivity, and overall academic performance; therefore, their design must respond to changing pedagogical and technical requirements (Rasmussen, 2020; Viñao, 2018; Otálora, 2020). Effective vocational facilities should provide appropriate classrooms, workshops, laboratories, circulation, furniture, equipment, and support spaces. However, evidence of inadequate compliance with educational infrastructure standards highlights the need for improved spatial planning, facilities, and architectural design in vocational training centres.

2.4 Sustainable Design Integration in Vocational Training Centres

Sustainable design is increasingly important in vocational training centres due to the environmental and energy impacts of buildings. VTCs can reduce their environmental footprint through energy-efficient technologies, sustainable materials, water-saving systems, passive design, and intelligent building controls (Yang, 2020). Passive strategies such as appropriate building orientation, natural lighting, ventilation, landscaping, and thermal design can reduce energy demand and improve indoor comfort (Sharma et al., 2019). These can be complemented by efficient HVAC systems, LED lighting, and smart controls that respond to occupancy and environmental conditions (ASHRAE, 2023; DOE, 2023). Beyond reducing operational costs and environmental impacts, sustainable VTCs can serve as practical learning environments where students experience and develop sustainable practices for future professional application.

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III. METHODOLOGY

The study adopts a mixed-method research design, combining quantitative and qualitative approaches to assess the condition, facilities, functionality, and architectural adequacy of vocational training centres (VTCs) in Oyo State. Primary data are obtained through structured questionnaires, physical observations, site assessments, photographic documentation, and case studies involving trainees, tutors, and other relevant stakeholders, while secondary data are obtained from academic literature, government records, institutional reports, design standards, and TVET guidelines.

The study uses multistage sampling, identifying eight VTCs across Oyo State and randomly selecting four centres for detailed study. The selected centres comprise 162 trainees and 8 tutors as respondents. Data on facility conditions, adequacy, functionality, and teaching and learning challenges are analysed using frequencies, percentages, cross-tabulation, and chi-square, while qualitative data are analysed through content and thematic analysis. Findings from the assessment will inform the development of an architectural design proposal for a functional vocational training centre in Ogbomoso.

IV. RESULTS AND FINDINGS

4.1 Condition of Existing Vocational Training Centres in Oyo State

The condition of the selected vocational training centres was assessed using a five-point scale ranging from Very Good (5) to Very Poor (1). The results in Table 1 indicate that the overall condition of the centres was poor, with an Average Weighted Value (AWV) of 2.32. Of the twelve components assessed, only classroom/lecture rooms, staff offices, and circulation/accessibility recorded fair ratings, with Mean Weighted Values (MWV) of 2.76, 2.69 and 2.58 respectively. All other components fell within the poor or very poor categories. The most critical deficiencies were observed in safety facilities (MWV = 1.87) and power supply (MWV = 1.94), while ICT facilities (MWV = 2.05) and library/resource centres (MWV = 2.18) also performed poorly.

Table 1: Condition of Existing Vocational Training Centres in Oyo State (n = 155)

S/N	Component	Very Good (5)	Good(4)	Fair (3)	Poor (2)	Very Poor (1)	Total	TWV	MWV	Remark
1	Workshop spaces	18	32	40	42	23	155	384	2.48	Poor
2	Training equipment/tools	15	28	38	45	29	155	358	2.31	Poor
3	Classroom/lecture rooms	22	40	45	30	18	155	428	2.76	Fair
4	ICT facilities	10	20	35	50	40	155	318	2.05	Poor
5	Power supply	8	18	30	52	47	155	301	1.94	Very Poor
6	Water supply	12	25	40	45	33	155	344	2.22	Poor
7	Sanitary facilities	16	30	42	40	27	155	372	2.40	Poor
8	Library/resource centre	14	22	36	48	35	155	338	2.18	Poor
9	Safety facilities	6	15	28	50	56	155	290	1.87	Very Poor
10	Storage facilities	14	28	40	45	28	155	366	2.36	Poor
11	Staff offices	20	38	44	32	21	155	417	2.69	Fair
12	Circulation & accessibility	18	35	48	34	20	155	400	2.58	Fair

Source: Author's Field Survey (2026).

The pattern indicates that the centres possess the basic physical components required for vocational training, but many of these components are operating below desirable standards. The relatively better rating of classrooms compared with workshops, equipment and safety facilities suggests that the formal instructional spaces are more adequately maintained than the spaces directly supporting practical training. This is important because vocational education depends heavily on hands-on activities, meaning that poor workshop conditions and weak equipment provision can directly constrain the quality of practical training. The very low rating for power supply is also significant because several vocational activities require continuous electricity for tools, machinery, ICT systems and workshop operations.

The poor rating for safety facilities further indicates a serious weakness in the physical environment. Safety is especially important in vocational centres because training activities may involve welding, electrical installation, carpentry, mechanical works and other potentially hazardous operations. The finding is consistent with the thesis literature, which identifies safety, health, comfort, ease of use and security as important performance dimensions in vocational learning environments. The observed condition therefore suggests that the existing centres are able to accommodate training in principle, but their physical infrastructure does not consistently provide the quality required for safe and effective skill acquisition.

4.2 Availability and Distribution of Facilities

Table 2 presents the availability of twelve major facility components across the five vocational training centres assessed in the thesis. Workshops, training equipment, classrooms, power supply, water supply, library/resource centres, storage facilities and staff offices were available in all five centres. However, ICT facilities were absent in Ogbomoso Vocational Training Centre and Iseyin Government Technical School, while sanitary facilities and circulation/accessibility provisions were also absent in these two centres. Safety facilities were similarly unavailable in Ogbomoso Vocational Training Centre but were present in the other centres.

Table 2: Availability of Major Facilities in Selected Vocational Training Centres

S/N	Facility Component	Ogbomoso VTC	Government Technical College	Oyo Zonal Vocational Institute	Iseyin Government Technical School	Federal Skill Acquisition Centre
1	Workshop	✓	✓	✓	✓	✓
2	Training equipment	✓	✓	✓	✓	✓
3	Classroom/lecture rooms	✓	✓	✓	✓	✓
4	ICT facilities	✗	✓	✓	✗	✓
5	Power supply	✓	✓	✓	✓	✓
6	Water supply	✓	✓	✓	✓	✓
7	Sanitary facilities	✗	✓	✓	✗	✓
8	Library/resource centre	✓	✓	✓	✓	✓
9	Safety facilities	✗	✓	✓	✓	✓
10	Storage facilities	✓	✓	✓	✓	✓
11	Staff offices	✓	✓	✓	✓	✓
12	Circulation & accessibility	✗	✓	✓	✗	✓

Source: Author's Field Survey (2026).

The results indicate that the basic infrastructure for vocational training exists across the selected centres, since no centre was completely without the core workshop, classroom, equipment and support components. However, the uneven distribution of ICT, sanitation, safety and accessibility facilities reveals important differences in the quality of provision. The absence of ICT facilities in two centres is particularly relevant in a training environment where digital technologies increasingly complement conventional vocational skills. Similarly, deficiencies in sanitary facilities may affect hygiene and the overall welfare of trainees, while gaps in accessibility may constrain use by persons with disabilities and affect general circulation.

The pattern also suggests that facility availability should not be interpreted as evidence of satisfactory provision. Although a workshop or classroom may physically exist, its usefulness depends on its condition, capacity, equipment and ability to support the activities for which it is provided. This distinction becomes clearer in the functionality assessment in Table 3, where several facilities that are available across the centres still receive low performance ratings.

4.3 Functionality of Existing Facilities

The functionality assessment in Table 3 demonstrates that the presence of a facility does not necessarily correspond with effective performance. Mean values for the assessed components ranged from 2.28 to 2.77, indicating generally low to moderate functionality. Workshop spaces recorded a mean of 2.49, while the effectiveness of training equipment recorded 2.36. Safety during practical sessions produced the lowest mean of 2.28. Comfort of the learning environment and cleanliness also recorded low values of 2.62 and 2.54 respectively. In contrast, ventilation and lighting (2.77) and ease of movement/circulation (2.70) were relatively stronger, although both remained below a highly satisfactory level.

Table 3: Functionality of Existing Facilities in the Selected Vocational Training Centres (n = 155)

S/N	Functionality Indicator	Mean	Remark
1	Functionality of workshop spaces	2.49	Low
2	Effectiveness of training equipment	2.36	Low
3	Comfort of learning environment	2.62	Low
4	Ventilation and lighting	2.77	Moderate
5	Ease of movement/circulation	2.70	Moderate
6	Safety during practical sessions	2.28	Low
7	Cleanliness of facilities	2.54	Low
8	Accessibility of facilities	2.66	Low

Source: Author's Field Survey (2026).

The results show that practical training spaces and equipment constitute major weaknesses in the existing centres. The mean value of 2.49 for workshop functionality indicates that the spaces are only partially capable of supporting training activities. More concerning is the lower rating for training equipment (2.36), suggesting that the tools and machines available to trainees may be inadequate, outdated or incapable of supporting effective practical instruction. The low safety score of 2.28 reinforces this problem because poorly functioning equipment and insufficient safety provisions can expose trainees to unnecessary risks during practical sessions.

The relatively better ratings for ventilation and lighting and circulation indicate that some basic environmental qualities are reasonably manageable within the centres. Nevertheless, their values of 2.77 and 2.70 remain below a strong performance level. This suggests that acceptable environmental conditions are present in some respects but are not sufficiently consistent to produce fully conducive learning environments. Overall, the concentration of the ratings below the midpoint of 3.00 demonstrates that users perceive the facilities as generally inadequate in functional terms. This finding supports the broader argument that the effectiveness of vocational education depends not only on the existence of facilities but also on their operational

condition and suitability for the activities undertaken within them.

4.4 Challenges Affecting Teaching and Learning Efficiency

The major challenges reported by respondents are presented in Table 4. Inadequate equipment and tools ranked first, with 148 responses (91.0%), followed by poor power supply with 136 responses (87.7%) and inadequate funding with 130 responses (83.9%). Poor maintenance culture ranked fourth at 80.6%, while lack of ICT facilities, inadequate workshop spaces and poor water/sanitation recorded 78.1%, 76.1% and 71.0% respectively. The thesis reports the challenge-response analysis using n = 163, although the main trainee analysis was based on 155 valid questionnaires.

Table 4: Major Challenges Affecting the Selected Vocational Training Centres (n = 163)

S/N	Identified Challenge	Frequency	Percentage (%)	Rank
1	Inadequate equipment and tools	148	91.0	1st
2	Poor power supply	136	87.7	2nd
3	Inadequate funding	130	83.9	3rd
4	Poor maintenance culture	125	80.6	4th
5	Lack of ICT facilities	121	78.1	5th
6	Inadequate workshop spaces	118	76.1	6th
7	Poor water/sanitation	110	71.0	7th

Source: Author's Field Survey (2026).

The dominance of inadequate equipment and tools as the highest-ranked challenge directly corresponds with the low functionality score of training equipment in Table 3. This indicates consistency between users' perceptions of the problem and their assessment of facility performance. A vocational training programme cannot effectively develop practical competencies where trainees have limited access to appropriate tools, machines and functional workshop resources. The second-ranked challenge, poor power supply, further compounds the equipment problem because many modern vocational processes depend on reliable electricity. The findings therefore point to an interconnected pattern in which equipment inadequacy, energy instability and weak maintenance collectively constrain practical training delivery.

Inadequate funding and poor maintenance culture also indicate that the observed physical deficiencies are not solely architectural or spatial problems. They reflect broader institutional and operational constraints affecting the ability of the centres to acquire, maintain and replace facilities. The ranking of ICT facilities as the fifth major challenge further demonstrates a technological gap within the centres, while inadequate workshop spaces points to limitations in the capacity available for hands-on activities. Poor water and sanitation, although ranked seventh, remains important because it affects the basic welfare and hygiene of trainees and staff.

4.5 Discussion of Findings

Taken together, the findings reveal that the vocational training centres in Oyo State possess the basic institutional framework required for skills training but operate under significant physical and functional constraints. The overall condition rating of 2.32, the low functionality scores, and the high frequency of reported challenges all point in the same direction: the major problem is not simply the absence of vocational institutions, but the inadequacy of the physical and operational resources supporting them. The results are therefore consistent with the broader literature reviewed in the thesis, which identifies infrastructure, environmental conditions, workshop organization, safety and equipment as important factors influencing the effectiveness of vocational education.

The findings also demonstrate that practical training spaces require greater attention than general instructional areas. Classrooms and circulation spaces performed relatively better than workshops, training equipment and safety facilities, yet vocational education is fundamentally dependent on practical engagement. The low assessment of workshop

functionality (2.49) and training equipment effectiveness (2.36) therefore represents a critical weakness in the delivery system. The result agrees with the thesis position that the physical environment influences learning outcomes, productivity and the acquisition of practical skills.

A further important finding is the relationship between facility condition, functionality and the challenges reported by users. Inadequate equipment and tools was the highest-ranked challenge, while training equipment functionality was simultaneously rated low. Poor power supply was the second-ranked challenge and was also rated very poorly in the assessment of overall facility condition. Similarly, poor maintenance culture was identified as a major challenge while cleanliness and general functionality received relatively low ratings. These correspondences strengthen the credibility of the findings because the same deficiencies appear from both the performance and problem-identification perspectives.

Overall, the evidence indicates that the selected vocational training centres are capable of supporting basic training activities but are not yet operating at a level that can consistently provide modern, safe and effective vocational education. The findings particularly highlight deficiencies in equipment, power supply, safety, ICT provision, maintenance, sanitation and workshop functionality. These conditions are likely to limit the extent to which vocational training can respond effectively to contemporary labour-market requirements and the growing need for practical and technology-supported skills development in Oyo State.

V. CONCLUSION

The study concludes that vocational training centres in Oyo State play an important role in technical education and skill acquisition, but their facilities are generally inadequate. Major deficiencies exist in workshops, equipment, ICT facilities, power supply, safety, water supply, and library resources, which affect practical learning and user satisfaction. The findings also highlight the need for flexible, technology-driven, sustainable, and well-maintained training environments.

VI. RECOMMENDATIONS

The recommendations from the study are:

1. Upgrade Workshop Facilities and Training Equipment – Provide modern workshops, specialized tools, and industry-standard equipment to improve practical skill acquisition.
2. Provide Reliable and Sustainable Power Infrastructure – Integrate alternative energy sources such as solar photovoltaic systems to support workshops, ICT facilities, and training activities.
3. Promote Flexible, Technology-Driven and Sustainable Design – Incorporate flexible workshops, ICT laboratories, smart classrooms, adequate libraries, natural lighting, cross-ventilation, renewable energy, and sustainable building materials.
4. Strengthen Facility Management and Maintenance Practices – Establish regular maintenance, facility inspections, preventive maintenance schedules, and adequate maintenance budgets.
5. Adopt User-Centred Planning and Integrated Support Facilities – Provide adequate circulation, sanitation, recreation, storage, cafeterias, health facilities, and accessible learning spaces while involving trainees, instructors, administrators, architects, and facility managers in the planning process.

REFERENCES

[1] Akinrata, O., & Adaramola, O. (2026). User-centered design for skill acquisition in Nigerian automobile training institutes: Case study insights.

[2] Akpan, U., Akangbe, O., & Essien, I. (2021). Historical development of vocational education in Nigeria. *Nigerian Journal of Technical Education, 4*(1), 10–25.

[3] Arroyo, L. (2020). Informal vocational training: Practical skill acquisition outside formal classrooms. *International Journal of Vocational Studies, 2*(1), 22–36.

[4] ASHRAE. (2023). *ASHRAE standards for energy-efficient building systems*. American Society of Heating, Refrigerating and Air-Conditioning Engineers.

[5] Atchoereria, P., & Delluc, A. (2002). *Revisiting technical and vocational education in Sub-Saharan Africa: An update on trends, innovations and challenges*. International Institute for Educational Planning/UNESCO.

[6] Ching, F. D. K. (2000). *Architecture: Form, space, and order* (2nd ed.). John Wiley & Sons.

[7] Department of Industry. (2013). *Energy efficiency in the Australian building sector*. Commonwealth of Australia.

[8] Department of Public Instruction. (2012). *Guidelines for the design and planning of vocational training centres*. Federal Ministry of Education.

[9] DOE. (2023). *Lighting energy efficiency and LED technology report*. U.S. Department of Energy.

[10] Dokubo, C. (2010). Learning environment and vocational training effectiveness in Nigeria. *Journal of Technical Education Studies, 2*(1), 44–59.

[11] Egunyomi, D., & Okora, I. (2020). *Youth empowerment and vocational training in Nigeria: Challenges and prospects*. Unpublished manuscript, University of Ibadan, Nigeria.

[12] Ezennia, I. (2022). Vocational education and workforce readiness in Nigeria. *African Journal of Educational Development, 5*(1), 30–47.

[13] Fatmawaty, E. (2017). Cognitive and social development in adolescent learners: Implications for school design. *Journal of Educational Psychology, 5*(2), 30–46.

[14] Gairín, J. (2024). School organizational resources and learning space performance. *International Journal of Educational Management, 38*(1), 12–30.

[15] Hernández, P. (2020). Habitability of educational spaces and its impact on learning. *Journal of School Environment Studies, 6*(3), 15–29.

[16] Indrawan, R. (2015). Architectural facilities and infrastructure in vocational education. *International Journal of Vocational Studies, 3*(2), 44–58.

[17] International Energy Agency. (2015). *Energy technology perspectives 2015: Mobilising innovation to accelerate climate action*. IEA. Crossref

[18] Irwanto, I. (2020). Holistic development in school systems: Psychological and moral growth of students. *Journal of Educational Policy and Practice, 4*(1), 22–38.

[19] Kakamega County Education Task Force Report. (2017). *Assessment of vocational training in Kakamega County, Kenya*. Kakamega County Government.

[20] Lorenzo, M. (2025). Physical learning environments and student performance. *Educational Spaces Review, 7*(1), 10–25.

[21] Mithraratne, N. (2007). *Energy consumption in buildings: A comparative study of UK and Australia*. Energy Research Institute.

[22] Nwadioha, S. (2019). Defining vocational education within technical education frameworks. *Journal of Nigerian Educational Research, 3*(2), 40–56.

[23] Obidile, E. (2018). Market-driven vocational education in Nigeria: Implications for youth employment. *African Journal of Labour Studies, 3*(1), 71–90.

[24] Oladejo, M. (2019). Entrepreneurial skills acquisition through vocational education in Nigeria. *Journal of Vocational Studies, 6*(1), 15–27.

[25] Olagbegi, A. (2015). Technical and vocational education as a strategy for employment generation. *Nigerian Journal of Educational Planning, 3*(2), 10–22.

[26] Oluwalola, T. (2018). Vocational education and national development in Nigeria. *Journal of African Vocational Education, 4*(1), 25–40.

[27] Osayomuanbor, E., & Edokpayi, D. (2018). Conceptualizing vocational and technical education for employability. *African Journal of Technical Education, 2*(2), 14–28.

[28] Osuala, P. (2024). Practical and applied competencies in vocational education. *Journal of Nigerian Education, 6*(1), 10–25.

[29] Otálora, M. (2020). Educational environments as active learning scenarios. *Journal of Learning Spaces, 6*(2), 33–48.

[30] Peretomode, V. (2021). *Foundations of vocational education in Nigeria: Historical perspectives*. Educational Publishers.

[31] Pusat, D. (2005). *National education standards compliance report: Vocational senior high schools in Central Jakarta*. Ministry of Education.

[32] Rasmussen, R. (2020). Functional adaptation in educational architecture. *Journal of Architectural Education, 74*(3), 45–60.

[33] Shaheen, M. (2017). Balancing theoretical and practical learning in vocational schools. *International Journal of Vocational and Technical Education, 5*(2), 44–59.

[34] Seyfried, C., & Pohlenz, P. (2018). Formal vocational training environments and instructional design. *Journal of Technical Education, 6*(1), 30–46.

[35] Sharma, A., Singh, R., & Kumar, P. (2019). Passive design strategies for energy-efficient buildings. *International Journal of Sustainable Architecture, 8*(2), 50–68.

[36] Singh, P., Verma, S., & Joshi, M. (2019). Intelligent building control systems: Enhancing efficiency in educational facilities. *Journal of Building Engineering, 24*, 100–115.

[37] UNESCO. (2006). *Technical and vocational education and training for the twenty-first century: UNESCO recommendations*. UNESCO Publishing.

[38] UNICEF. (2009). *Child-friendly schools: Guidelines for safe and supportive learning environments*. United Nations Children's Fund.

[39] Viñao, J. (2018). Value of school spaces in supporting education. *Educational Facilities Journal, 12*(2), 25–41.

[40] World Bank. (2011). *Skills development in Sub-Saharan Africa: Strategies for employment and growth*. World Bank.

[41] Yang, L. (2020). Sustainable building materials and energy-efficient systems in vocational schools. *Journal of Green Building, 15*(1), 35–52.