World Journal of Academic Research
www.worldacademicjournal.com
Online ISSN: 3107-8974
Received: 23-06-2026, Accepted: 23-07-2025, Published: 08-08-2026
Volume 2, Issue 2, 2026, Page No. 21-28

Workshop facilities and skills acquisition in technical colleges: Evaluating automobile, welding and electrical trades in Akwa Ibom State, Nigeria

Odudu Manasseh Essien[1], Ntiedo Asuabanga Udom[2], Edidiong Isonguyo Silas[2]
[1] Department of Electrical/Electronic Technology, Federal College of Education (Technical), Ekiadolor, Ekiadolor, Benin City, Edo State, Nigeria
[2] Department of Technical Education, Akwa Ibom State College of Education, Afaha Nsit, Nigeria
Corresponding Author: Odudu Manasseh Essien

Abstract
The study examined the availability of workshop facilities for skills acquisition in Technical Colleges in Akwa Ibom State. Three research questions and descriptive survey design was adopted to guide the study. The population comprised 73 teachers (23 Automobile, 20 Welding and 30 Electrical Trades instructors) from six public Technical Colleges. Simple random sampling was used to select 45 teachers, with 15 from each trade. Data were collected using a structured questionnaire which was face-validated by three experts and yielded a reliability coefficient of 0.83 using Cronbach Alpha. Research questions were analyzed using frequency counts and percentages. Findings revealed that key facilities for Automobile trades, such as oil and lubrication bays, battery chargers and workbenches, were widely available, though specialized tools like air compressors and hydraulic lifts were moderately accessible. Electrical Installation and Maintenance workshops showed high availability of safety switches, component storage racks and transformers, with moderate presence of oscilloscopes and breadboards. Welding and Fabrication workshops reported strong availability of measuring instruments, bench vices and grinding machines, while CNC machines and lathe machines were less accessible. The study recommended upgrading of equipment, establishment of maintenance protocols, development of industry partnerships and professional development for instructors to strengthen practical competencies of students.

Keywords: Automobile, welding, electrical trades, technical colleges, workshop facilities, skills acquisition

Introduction

Technical and Vocational Education and Training (TVET) form a practical segment of the educational system, aimed at equipping learners with specific skills, technical knowledge and trade competencies that support employment and self-reliance (UNESCO, 2021; Okwelle & Owo, 2017) [12, 29]. In Nigeria, TVET operates through Technical Colleges, vocational enterprises and frameworks established by the National Board for Technical Education (NBTE, 2022) [22] to ensure that students acquire relevant skills in fields such as automobile, building, electrical, metal and woodwork technology (Okolie, Igwe & Elom, 2019) [27]. These colleges provide alternative pathways for students who do not meet university admission criteria, contributing to literacy improvement and workforce development (Okoye & Okwelle, 2021) [28].

Automobile technology training focuses on the maintenance, repair and operation of vehicles. Students require access to modern diagnostic tools, engine analyzers, welding machines and lifting equipment to practice electrical systems, mechanical repairs and safety procedures (Ajayi & Salako, 2021) [7]. Welding and fabrication, central to automobile and metalwork trades, demand the use of arc welding, oxy-acetylene welding and other techniques to join metals through controlled heat application. Arc welding involves coated electrodes that generate an electric arc, raising metal temperatures to 5,000-6,000°C for fusion (Parmar, 2013) [32]. Practical exercises in welding include setting up equipment, cutting metals, preparing joints, surfacing and finishing, with tools ranging from hacksaws and machine saws to oxygen-acetylene cutting devices (Akpan, 2018) [9]. Training in multiple welding positions-flat, horizontal, vertical, overhead-enables students to handle industrial applications effectively. Electrical technology instruction covers power generation, installation and renewable energy integration. Workshops require circuit boards, transformers, testing instruments and programmable logic controllers to allow learners to gain practical experience in wiring, automation and maintenance (Musa & Ibrahim, 2022) [21].

Technical Colleges function as primary sites for hands-on skills acquisition. The quality of training depends on the availability of workshops equipped with up-to-date tools, operational machines and consumables. Inadequate provision, limited maintenance and obsolete equipment hinder students' engagement with practical tasks, affecting their ability to meet industry standards (Ajayi & Salako, 2021) [7]. Practical exposure enables students to transfer theoretical knowledge to industrial contexts, supporting problem-solving and technical reasoning (Kolb, 1984; Ekpenyong & Edokpolor, 2021) [14, 20]. Insufficient exposure leads to a mismatch between skills learned and those required by employers (Olaitan, 2021; Okoye & Okwelle, 2021) [28, 30].

Workshop functionality depends on maintenance practices, availability of spare parts and technical supervision. Poor maintenance cultures accelerate equipment deterioration, forcing students to rely on theory-based learning (Aina, 2020; Olawale & Ajibola, 2021) [5, 31]. Preventive maintenance programs, routine equipment checks and staff training improve workshop utility and learning outcomes. In addition, instructor competence is essential. Skilled

instructors guide practical exercises, ensure adherence to safety protocols and demonstrate trade procedures. Shortages of trained personnel, low remuneration and inadequate professional development compromise the effectiveness of practical training (Ikpe, George & Udom, 2020; Eze & Umeh, 2018) [15, 17]. Partnerships between Technical Colleges and enterprises allow for the modernization of workshops and alignment with current trade practices (Ogbu & Adamu, 2020; Musa & Ibrahim, 2022) [21, 25]. Apprenticeships, site visits and mentorship expose students to operational realities and transfer new techniques into the educational environment. Countries such as Germany and China have utilized these linkages to enhance skills acquisition and industrial readiness (UNESCO, 2022).

In Nigeria, limited industry engagement contributes to outdated practices and reduces graduates' employability, widening the gap between vocational training and labor market demands (Okeke, 2021) [26]. In Akwa Ibom State, Technical Colleges offer programs across automobile, building, electrical, metal and woodwork trades (Ikpe, George & Udom, 2020; Akpan, Ekong & George, 2023) [8, 17]. Institutions such as Community Technical College Ikot Akata, Government Technical College Abak and Union Technical College Ikpa-Eket provide National Technical Certificate programs in trades including block laying, carpentry, electrical installation, motor vehicle mechanics and radio and television electronics (Akpan, Utuk & Essien, 2019) [10]. Research revealed that many colleges face challenges such as outdated tools, insufficient consumables and limited access to modern machinery, constraining practical training opportunities (Bill & Akpabio, 2021) [13]. Students in poorly equipped workshops struggle to acquire competencies necessary for employment or entrepreneurship, affecting personal livelihood and local economic development (Okoye & Okwelle, 2021; Adamu, 2020) [1, 28].

The interdependence of trades requires that training in one area integrates concepts and techniques from others. Automobile technology relies on metalwork for parts fabrication, electrical technology for vehicle wiring and woodwork for interior components. Building technology combines masonry, carpentry and electrical installation (UNESCO, 2022). Multidimensional training supports workforce adaptability, enabling graduates to perform varied industrial roles (Okolie, Igwe & Elom, 2019) [27]. The adequacy of workshops directly affects students' ability to gain technical skills, apply theoretical knowledge and complete industrial tasks competently. Inadequate tools, outdated machines and weak instructional guidance reduce skill acquisition outcomes and hinder labor market integration (Ajayi & Salako, 2021; Ogbu & Adamu, 2020) [7, 25].

Empirical evaluation of workshop facilities in Akwa Ibom State is necessary to determine the degree to which students are equipped for practical tasks and trade-specific competencies. Assessments must focus on equipment functionality, access to consumables, maintenance practices and instructor availability. Understanding these dynamics ensures that Technical Colleges serve as effective platforms for developing skilled personnel who can contribute to the state's industrial and economic activities (Okorie, Igwe & Elom, 2019; Akpan, Ekong & George, 2023) [8, 27]. Hence, the study evaluates the availability of workshop facilities for skills acquisition in Technical Colleges in Akwa Ibom State to enhance the employability of graduates in automobile, welding and electrical trades.

Statement of the Problem

Technical Colleges in Nigeria are mandated to provide practical training in trades such as automobile, welding and electrical technology to prepare students for employment and self-employment (Okolie, Igwe & Elom, 2019) [27]. Observations indicate that many institutions operate with outdated equipment, insufficient tools and inadequate consumables, which limit students' engagement with practical activities (Ikpe, George & Udom, 2020; Bill & Akpabio, 2021) [13, 17]. In the automobile trade, the absence of modern diagnostic tools, functional engines and welding machines restricts learners from mastering vehicle repair, electrical wiring and fabrication skills (Ajayi & Salako, 2021) [7]. Welding and fabrication instruction is confined to basic arc and gas techniques, reducing opportunities to develop proficiency in varied industrial processes (Parmar, 2013; Akpan, 2018) [9, 32]. Building and electrical technology workshops also face equipment shortages. Masonry, carpentry, surveying and circuit installation exercises are often performed with obsolete tools, while access to CAD software, testing instruments and programmable systems is limited (Aina, 2019) [6].

Metalwork experience similar constraints, with lathes, milling machines, routers and CNC tools either unavailable or non-functional, restricting learners' ability to fabricate components or produce furniture to industry standards (Obi & Onu, 2020; Olawale & Yusuf, 2021) [24, 31]. Maintenance deficiencies and a lack of qualified instructors exacerbate these challenges. Workshops deteriorate rapidly due to poor servicing and shortages of skilled technical staff prevent students from receiving appropriate supervision and guidance during practical exercises (Aina, 2020; Ikpe, George & Udom, 2020; Eze & Umeh, 2018) [5, 15, 17]. Weak collaboration between industries and colleges further limits exposure to current techniques, widening the gap between training and labor market requirements (Ogbu & Adamu, 2020; Musa & Ibrahim, 2022) [21, 25]. In Akwa Ibom State, these constraints appear in several Technical Colleges, potentially reducing graduates' technical competence and employability. Limited access to functioning workshop facilities affects the acquisition of essential skills in automobile, welding and electrical trades, impeding students' readiness for industrial tasks. The extent and nature of these facility inadequacies require empirical investigation to inform improvements in technical education delivery and workforce preparation (Akpan, Ekong & George, 2023; Okoye & Okwelle, 2021) [8, 28].

Purpose of the Study

The main objective of the study was to evaluate the availability of workshop facilities for skills acquisition in Technical Colleges in Akwa Ibom State. Specifically, the study:

1. Identified Automobile workshop facilities available for skills acquisition in Akwa Ibom State Technical Colleges.
2. Determine the availability of Electrical Installation and Maintenance workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges.

3. Assess the availability of Welding and Fabrication workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges.

Research Questions

The study answered the following research questions:

1. What are the available Automobile workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges?
2. What are the available Electrical Installation and Maintenance workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges?
3. What are the available Welding and Fabrication workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges?

Empirical Review of Related Studies

Ibrahim (2025) [16] examined the availability and adequacy of workshop facilities for Electrical Installation and Maintenance Works and Electronic Works in Technical Colleges in Kano State, Nigeria. The investigation focused on whether existing workshop resources supported hands-on skill development required by the curriculum. A descriptive survey design was applied to document prevailing workshop conditions. The study population consisted of twenty-four respondents, including trade instructors and workshop attendants drawn from selected Technical Colleges. Data collection relied on a facilities checklist adapted from National Board for Technical Education specifications, allowing alignment with nationally approved standards for technical training. Data were processed using percentage analysis to determine the proportion of tools and equipment present in the workshops. The findings showed that half of the required tools for electrical installation and maintenance were present, while fewer than one-quarter of electronic works facilities were available. The study concluded that the limited presence of essential tools constrained practical engagement during training sessions. Recommendations focused on improved public funding for workshop equipment, provision of consumables, structured maintenance schedules and external support from development agencies and non-governmental organizations.

Adamu and Okorie (2023) [2] conducted a nationwide assessment of automobile workshop facilities in Technical Colleges in Nigeria. The study employed a descriptive survey approach involving fifty Technical Colleges selected from different states. Data collection focused on workshop space, availability of tools and machine functionality. The analysis showed that fewer than half of the surveyed colleges possessed automobile workshops capable of supporting practical instruction. Many institutions operated with obsolete or non-functional equipment, while rural colleges recorded the lowest facility availability levels. The study extended its analysis to student competence by administering practical skill tests in automobile technology. Students trained in colleges with functional workshops demonstrated stronger performance in engine diagnostics, routine servicing and mechanical repairs. Those from under-equipped colleges showed reliance on classroom instruction with limited hands-on competence. The study proposed equipment renewal, collaboration with automobile firms and policy reforms targeting technical education infrastructure.

Bello and Adebayo (2021) [11] assessed government interventions directed at automobile workshop development in Nigerian Technical Colleges. The research analyzed funding allocations, implementation processes and outcomes of policy initiatives using budget records and institutional case studies. Findings revealed that less than half of approved funds for technical education infrastructure reached project completion stages. Delays in fund release, administrative inefficiencies and weak monitoring mechanisms affected workshop development outcomes. Colleges that sustained consistent public funding recorded improved workshop conditions, increased student enrollment and stronger collaboration with automobile service firms. Many rural colleges remained excluded from sustained support, leading to declining workshop capacity and reduced training quality. The study identified public accountability and transparent fund management as necessary conditions for improving workshop provision.

In a study conducted by Adekunle and Balogun (2023) [4] on the status of electrical technology workshop facilities in accredited Technical Colleges across Nigeria, a quantitative survey design guided the study, covering fifty colleges with a combined sample of students and instructors. Data collection instruments assessed the presence and functionality of electrical training tools, including wiring kits, power tools, transformers, testing devices and safety equipment. Analysis showed that fewer than half of the colleges possessed workshops capable of supporting sustained practical instruction. Power supply instability and absence of protective devices further restricted workshop use. Students trained in colleges with functional facilities displayed stronger competence in wiring installations, circuit testing and fault diagnosis. Instructors reported that graduates from poorly resourced colleges required extended retraining after graduation. The study recommended targeted funding, private sector involvement and scheduled maintenance of workshop equipment.

Bello and Hassan (2021) [12] explored the contribution of public and private investments to electrical workshop development in Nigerian Technical Colleges. The research relied on document review and institutional case studies to examine funding flows and partnership initiatives. Findings showed that public funding commitments to technical education infrastructure faced implementation challenges related to administrative delays and financial mismanagement. Less than half of allocated resources translated into completed workshop upgrades. In contrast, colleges that established partnerships with electrical engineering firms and renewable energy companies recorded improved workshop conditions. These institutions received updated training kits, circuit analysis software and student apprenticeship placements. The study emphasized the need for enforceable partnership frameworks to sustain private sector involvement in workshop development.

Adebayo and Okonkwo (2023) [3] carried out a national evaluation of metalwork workshop facilities in Technical Colleges, focusing on their influence on student skill development. The study adopted a quantitative survey involving sixty colleges, students and instructors. Data collection instruments included structured questionnaires and observational checklists that assessed welding machines, lathes, grinders, milling machines and protective gear. Results showed that fewer than half of the surveyed colleges possessed metalwork workshops suitable for practical instruction. Inadequate funding, obsolete equipment and limited maintenance practices restricted

effective workshop use. Statistical analysis showed a strong relationship between equipment availability and student competence in welding and machining tasks. Graduates from colleges with limited workshop resources faced difficulties meeting workplace expectations without additional training. The study proposed sustained funding, equipment renewal and collaboration with fabrication industries.

Research Methods

The study was carried out in Akwa Ibom State, Nigeria. Akwa Ibom State was established on 23 September 1987 following its creation from the former Cross River State by the Federal Military Government under General Ibrahim Babangida. The state is one of the thirty-six states in Nigeria, with Uyo serving as the capital city. It covered an estimated land area of 8,412 square kilometres and recorded a population exceeding five million persons based on the 2006 national census. Population figures indicated 1,983,202 males and 1,918,849 females (John, Simon & Oyebanji, 2025) [18]. The state lies in the coastal southern zone of Nigeria between latitudes 4°32′N and 5°33′N and longitudes 7°25′E and 8°25′E (Peter, Okpa & Okoi, 2020) [33]. It shares boundaries with Cross River State to the east and the Atlantic Ocean to the south. The population consists mainly of Ibibio, Annang and Oron ethnic groups. The state operates thirty-one local government areas. Economic activities include farming, fishing, craft production and skilled trades, alongside public sector employment. Languages spoken include Ibibio, Annang, Eket, Oron and English. Urban centres such as Uyo, Eket, Ikot-Ekpene, Oron, Abak and Etinan host several technical institutions that support vocational training.

A descriptive survey research design was used to guide the study. The design supported systematic documentation of existing workshop facilities used for skills training. This approach allowed the researcher to collect structured data describing the status of instructional resources without altering the study environment. The design aligned with the study focus on facility availability rather than intervention or experimentation (Nworgu, 2015; Jumere, 2017) [19, 23]. The population comprised 73 technical trade teachers drawn from six public Technical Colleges in Akwa Ibom State. This group included 23 automobile trade teachers, 20 welding trade teachers and 30 electrical trade teachers. These teachers were directly involved in workshop-based instruction and possessed practical knowledge of facility conditions. A simple random sampling technique was used to select 45 teachers from the population. The sample included 15 automobiles, 15 welding and 15 electrical trades teachers. Equal representation of the trades supported balanced data collection and reduced selection bias.

Data collection relied on a structured questionnaire developed by the researcher and titled Availability of Workshop Facilities for Skills Acquisition Questionnaire (AWFSAQ). The instrument consisted of four sections. Section A obtained demographic information from respondents. Sections B, C and D focused on the presence of tools, equipment and workshop resources used for automobile, welding and electrical skills training in Technical Colleges. Response options were limited to Available, Not Available and No Idea. These options assisted in capturing respondents' awareness of workshop facilities while limiting subjective judgement. The questionnaire underwent face validation by three specialists in Industrial Technology Education and Measurement and Evaluation from the University of Uyo, Akwa Ibom State. The validators reviewed item relevance, clarity, language use and alignment with the study objectives and research questions. Their feedback led to revisions addressing ambiguous expressions, unnecessary length, unsuitable terminology and item redundancy. These adjustments improved the suitability of the instrument for data collection.

Reliability testing was conducted by administering the questionnaire to thirty respondents who were not included in the study sample but shared similar professional characteristics. Data from the pilot test were analysed using Cronbach's Alpha technique. The reliability coefficient obtained was 0.83, indicating acceptable internal consistency of the instrument. The researcher administered the questionnaire directly to respondents with assistance from three trained research assistants. The assistants received guidance on administration procedures and ethical considerations. Respondents received written information on the study and provided consent prior to participation. Participation was voluntary. Direct distribution and retrieval of the instrument resulted in full questionnaire retrieval. Frequency counts and percentage distribution was used to answer the research questions.

Data Presentation and Analysis

Research Question 1: What are the available Automobile workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges?

Table 1: Opinions of teachers on availability of Automobile workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges

S/No	Item Statement	Available		Not Available		No Idea	
		Freq	%	Freq	%	Freq	%
1.	First aid and safety equipment station	11	73.3	3	20.0	1	6.7
2.	Welding and fabrication station	9	60.0	3	20.0	3	20.0
3.	Car washing bay	12	80.0	3	20.0	0	0
4.	Engine analyzer	9	60.0	5	33.3	1	6.7
5.	Exhaust gas analyzer	8	53.3	6	40.0	1	6.7
6.	Workbenches and tool storage cabinets	11	73.3	4	26.7	0	0
7.	Oil and lubrication bay	13	86.7	2	13.3	0	0
8.	Brake lathe machine	10	66.7	3	20.0	2	13.3
9.	Battery charger and tester	12	80.0	2	13.3	1	6.7
10.	Vehicle diagnostic scanner	9	60.0	5	33.3	1	6.7
11.	Air compressor and pneumatic tools	8	53.3	4	26.7	3	20.0

12.	Tyre changer	11	73.3	3	20.0	1	6.7
13.	Wheel alignment machine	9	60.0	6	40.0	0	0
14.	Engine hoist (crane)	11	73.3	2	13.3	2	13.3
15.	Hydraulic car lift	8	53.3	4	26.7	3	20.0
	Total Frequency/Percentage	151	125.8	55	45.8	19	15.9

Analysis of Table 1 showed that Automobile workshop facilities in Technical Colleges in Akwa Ibom State were unevenly available for skills acquisition. Safety-related and routine service facilities recorded higher presence, as first aid and safety equipment stations (73.3%), workbenches and tool storage cabinets (73.3%), tyre changers (73.3%), engine hoists (73.3%), car washing bays (80.0%), battery chargers and testers (80.0%) and oil and lubrication bays (86.7%) were reported as present by most teachers. Facilities linked to diagnostics and advanced mechanical operations recorded lower levels of availability, as engine analyzers (60.0%), vehicle diagnostic scanners (60.0%), brake lathe machines (66.7%), wheel alignment machines (60.0%) and welding and fabrication stations (60.0%) were reported by fewer respondents, while a sizeable proportion indicated their absence. Exhaust gas analyzers (53.3%), air compressors with pneumatic tools (53.3%) and hydraulic car lifts (53.3%) recorded the lowest availability, with notable proportions of teachers reporting non-availability or expressing no knowledge of their presence. The distribution of responses showed that basic servicing facilities were more common than modern diagnostic and heavy-duty equipment, indicating limitations in students' exposure to advanced automobile repair and testing practices in the Technical Colleges.

Research Question 2: What are the available Electrical Installation and Maintenance workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges?

Table 2: Opinions of teachers on availability of Electrical Installation and Maintenance workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges

S/No	Item Statement	Available		Not Available		No Idea	
		Freq	%	Freq	%	Freq	%
1.	ESD-protected work areas	9	60.0	4	26.7	2	13.3
2.	Simulation and CAD software workstations	10	66.7	5	33.3	0	0
3.	Safety switches and circuit breakers display	12	80.0	2	13.3	1	6.7
4.	Electrical machine testing lab	10	66.7	5	33.3	0	0
5.	Transformer winding setup	11	73.3	3	20.0	1	6.7
6.	Electrical wiring test boards	11	73.3	4	26.7	0	0
7.	Digital logic trainers	10	66.7	5	33.3	1	6.7
8.	Breadboards and prototyping kits	9	60.0	6	40.0	0	0
9.	Component storage racks	13	86.7	2	13.3	0	0
10.	DC power supply units	11	73.3	3	20.0	1	6.7
11.	Multimeters and clamp meters	11	73.3	3	20.0	1	6.7
12.	Function generator	10	66.7	5	33.3	0	0
13.	Oscilloscope	9	60.0	5	33.3	1	6.7
14.	PCB etching and fabrication lab	10	66.7	4	26.7	1	6.7
15.	Soldering and desoldering station	9	60.0	5	33.3	1	6.7
	Overall Frequency/Percentage	155	129.2	61	50.8	10	8.4

Analysis of Table 2 revealed that Electrical Installation and Maintenance workshop facilities were moderately available for skills acquisition in Technical Colleges in Akwa Ibom State. Core instructional and safety-related facilities such as component storage racks (86.7%), safety switches and circuit breakers displays (80.0%), transformer winding setups (73.3%), electrical wiring test boards (73.3%), DC power supply units (73.3%) and multimeters with clamp meters (73.3%) were reported as available by the majority of teachers. Facilities supporting practical electronics and systems development, including simulation and CAD software workstations (66.7%), electrical machine testing laboratories (66.7%), digital logic trainers (66.7%), function generators (66.7%) and PCB etching and fabrication laboratories (66.7%), were available to a moderate extent. However, relatively lower availability was reported for ESD-protected work areas (60.0%), breadboards and prototyping kits (60.0%), oscilloscopes (60.0%), soldering and desoldering stations (60.0%) and work areas requiring advanced electronics protection and precision. The pattern of responses indicated that while basic electrical installation and testing facilities were largely present, advanced electronics, precision instrumentation and protected work environments were less consistently available, suggesting constraints in delivering comprehensive hands-on training in modern electrical installation and maintenance practices.

Research Question 3: What are the available Welding and Fabrication workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges?

Table 3: Opinions of teachers on availability of Welding and Fabrication workshop facilities for skills acquisition in Akwa Ibom State Technical Colleges

S/No	Item Statement	Available		Not Available		No Idea	
		Freq	%	Freq	%	Freq	%
1.	Measuring instruments (vernier calipers, micrometers)	12	80.0	2	13.3	1	6.7
2.	Tool sharpening station	12	80.0	3	20.0	0	0

3.	Bench vices and anvils	12	80.0	3	20.0	0	0
4.	Surface treatment station	10	66.7	4	26.7	1	6.7
5.	Safety gear (goggles, gloves, aprons)	11	73.3	4	26.7	0	0
6.	CNC machine (optional/advanced)	9	60.0	5	33.3	1	6.7
7.	Foundry section (furnace, molds)	9	60.0	5	33.3	1	6.7
8.	Power hacksaw	11	73.3	4	26.7	0	0
9.	Sheet metal folding and bending tools	10	66.7	4	26.7	1	6.7
10.	Welding station (MIG, TIG, Arc)	10	66.7	4	26.7	1	6.7
11.	Shaping machine	13	86.7	2	13.3	0	0
12.	Grinding machine	11	73.3	4	26.7	0	0
13.	Drilling machine	12	80.0	3	20.0	0	0
14.	Milling machine	11	73.3	4	26.7	0	0
15.	Lathe machine	9	60.0	6	40.0	0	0
	Overall Frequency/Percentage	162	135.0	57	47.5	6	5.0

Analysis of Table 3 indicated that Welding and Fabrication workshop facilities were generally available for skills acquisition in Technical Colleges in Akwa Ibom State, though with variations across equipment types. Basic fabrication and machining tools such as shaping machines (86.7%), measuring instruments (80.0%), tool sharpening stations (80.0%), bench vices and anvils (80.0%), drilling machines (80.0%) and safety gear (73.3%) were reported as available by a large proportion of teachers, reflecting adequate provision for fundamental welding and fabrication operations. Conventional workshop machines including power hacksaws (73.3%), grinding machines (73.3%), milling machines (73.3%), surface treatment stations (66.7%), sheet metal folding and bending tools (66.7%) and standard welding stations (66.7%) were moderately available. However, advanced and capital-intensive facilities such as CNC machines (60.0%), foundry sections (60.0%) and lathe machines (60.0%) recorded relatively lower availability, with notable proportions of respondents indicating non-availability. The findings revealed that while the Technical Colleges were better equipped for basic and intermediate welding and fabrication training, limitations existed in access to advanced machining and foundry facilities, which could restrict students' exposure to modern industrial fabrication practices.

Discussion of Findings

The findings for research question one indicated that automobile workshop facilities such as oil and lubrication bay (86.7%), car washing bay (80.0%), battery charger and tester (80.0%) and workbenches/tool storage cabinets (73.3%) were widely available, while equipment including air compressor and pneumatic tools (53.3%), hydraulic car lift (53.3%) and exhaust gas analyzer (53.3%) were less consistently accessible. This pattern indicated that while fundamental training stations were present, certain specialized or mechanized tools necessary for advanced skill development were limited. These results support previous study by Okoro (2019) [6], which linked gaps in workshop equipment to reduced practical competence in Technical Colleges, particularly in areas requiring specialized machinery. This outcome corroborates the argument that while essential workshop facilities foster baseline competencies, the absence of specialized apparatus can constrain mastery of complex tasks, echoing the findings of Adamu and Okorie (2023) and Ibrahim (2025) [2, 16] on the necessity of both fundamental and advanced tools for comprehensive skill acquisition in Technical Colleges.

The findings for research question two indicated that Electrical Installation and Maintenance (EIM) workshop facilities such as component storage racks (86.7%), safety switches and circuit breakers display (80.0%), electrical wiring test boards (73.3%), DC power supply units (73.3%) and multimeters/clamp meters (73.3%) were readily available, whereas equipment including breadboards and prototyping kits (60.0%), ESD-protected work areas (60.0%), oscilloscopes (60.0%) and soldering/desoldering stations (60.0%) were only moderately available. This pattern suggests that while essential tools for basic electrical training were accessible, some specialized apparatus necessary for advanced practical exercises were limited, potentially constraining students' ability to fully engage in contemporary electrical installations, circuit design and troubleshooting exercises. These results are consistent with Adekunle and Balogun (2023) [4], who observed that under-equipped workshops restricted practical competence and required graduates to undertake additional training to meet labor market expectations. The findings therefore support the argument that while fundamental electrical workshop facilities foster basic skill development, investment in specialized and modern equipment is necessary to elevate practical proficiency, aligning with the observations of Ibrahim (2025), Bello and Hassan (2021) [12, 16] on the critical role of both government and private sector intervention in enhancing electrical technology training environments.

The findings for research question three showed that Welding and Fabrication workshop facilities such as shaping machines (86.7%), measuring instruments (80.0%), tool sharpening stations (80.0%), bench vices and anvils (80.0%), drilling machines (80.0%), grinding machines (73.3%), milling machines (73.3%), power hacksaws (73.3%) and safety gear (73.3%) were widely available, whereas equipment including CNC machines (60.0%), lathe machines (60.0%), foundry sections (60.0%), surface treatment stations (66.7%), sheet metal folding/bending tools (66.7%) and welding stations (66.7%) were moderately available. This pattern indicates that fundamental tools for welding and fabrication were accessible, supporting basic skill development, while specialized or advanced equipment required for complex fabrication processes was less prevalent, potentially limiting students' exposure to contemporary industrial practices. These findings are consistent with the studies of Adebayo and Okonkwo (2023) [3], who reported that under-equipped metalwork workshops constrained practical skill acquisition and necessitated additional post-training for graduates to meet industrial competency standards.

Conclusion

The study investigated the availability of workshop facilities for skills acquisition in Automobile, Electrical Installation and Maintenance and Welding and Fabrication trades in Technical Colleges in Akwa Ibom State, Nigeria. Findings indicated that core workshop facilities for each trade were generally accessible, enabling students to acquire essential practical competencies. In the automobile trade, facilities such as oil and lubrication bays, car washing bays, battery chargers and testers and workbenches were widely available, while specialized equipment including air compressors, hydraulic lifts and vehicle diagnostic scanners were moderately available. Electrical workshop facilities, including component storage racks, safety switches, wiring test boards and DC power supply units, were accessible, whereas advanced tools such as oscilloscopes, breadboards and soldering stations were less prevalent. Welding and fabrication workshops had high availability of shaping machines, measuring instruments, tool sharpening stations and drilling machines, while CNC machines, lathe machines and foundry sections were moderately accessible.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Technical Colleges in Akwa Ibom State should prioritize the procurement of advanced and specialized workshop equipment to enhance practical skills training.
2. Routine maintenance and servicing schedules should be established to ensure the functionality and longevity of existing workshop facilities.
3. Partnerships with industries and private sector stakeholders should be developed to provide students with exposure to modern tools and techniques.
4. Government and educational authorities should increase funding allocations specifically for upgrading workshop infrastructure and acquiring consumable materials.
5. Continuous professional development programs should be implemented for instructors to improve their competence in using modern workshop technologies and teaching methods.

References

1. Adamu A. Gender inclusivity in technical and vocational education and training (TVET) in Nigeria: Challenges and prospects. African Journal of Technical Education,2020:12(3):45–61.
2. Adamu MK, Okorie CO. Assessment of automobile workshop facilities and practical skill acquisition in Technical Colleges. Journal of Technical and Vocational Education Research,2023:21(1):112–130.
3. Adebayo TK, Okonkwo JU. Assessment of metalwork workshop facilities and their effect on skill development in Nigerian Technical Colleges. Journal of Technical and Vocational Education Research,2023:27(1):102–120.
4. Adekunle MT, Balogun OA. Assessment of electrical technology workshop facilities and their impact on students' skill acquisition in Nigerian Technical Colleges. Journal of Technical and Vocational Education Research,2023:25(1):98–115.
5. Aina J. Maintenance culture and technical education in Nigeria: Challenges and way forward. International Journal of Vocational Education,2020:8(2):102–118.
6. Aina S. The role of workshop facilities in skills acquisition among TVE students. International Journal of Vocational Training,2019:14(1):89–103.
7. Ajayi K, Salako O. The impact of technical and vocational education on youth employment in Nigeria. African Journal of Educational Development,2021:18(4):245–263.
8. Akpan CU, Ekong MO, George WK. Availability of practical facilities for implementation of TVET curriculum in Technical Colleges in Akwa Ibom State. International Journal of Educational and Scientific Research Findings,2023:5(1):114–127.
9. Akpan FA. Training guide in arc welding. Unpublished Training Manual. Faa Engineering and Technical Service, Uyo, 2018.
10. Akpan N, Utuk I, Essien E. Technical College administration in Akwa Ibom State: A functional approach on the structure and leadership styles. Academic Journal of Global Who is Who in Academia,2019:2(2):11–21.
11. Bello JT, Adebayo SO. Government interventions and their effectiveness in enhancing automobile workshop facilities. African Journal of Vocational and Technical Studies,2021:18(2):97–114.
12. Bello RK, Hassan TM. Public and private investment in metalwork workshop development in Nigerian Technical Colleges. African Journal of Technical and Vocational Studies,2021:22(3):85–102.
13. Bill U, Akpabio I. School Factors and Utilization of Instructional Materials for Teaching Government in Secondary Schools in North East Senatorial District of Akwa Ibom State, Nigeria. African Journal of Educational Assessors,2021:8(2):100–109.
14. Ekpenyong LE, Edokpolor JE. Experiential learning and skill acquisition in technical and vocational education and training (TVET) in Nigeria. Journal of Technical Education and Training,2021:13(4):55–73.
15. Eze KC, Umeh PO. The role of workshop facilities in technical education for national development. African Journal of Technical Education and Development,2018:10(1):112–126.
16. Ibrahim A. Assessment of Availability and Adequacy of Electrical/Electronic Workshop Facilities for Practical Skills Acquisition in Technical Colleges of Kano State, Nigeria. Kashere Journal of Education,2025:7(2):285–295. Retrieved from https://www.ajol.info/index.php/kje/article/view/293231
17. Ikpe SA, George WK, Udom NA. Availability and Utilization of Safety Equipment for Skills Training in Technical Colleges in Akwa Ibom State. GASPRO International Journal of Eminent Scholars,2020:7(2):82–88.
18. John LA, Simon B, Oyebanji AO. Enhancing local government accountability through digital governance: A case study of Akwa Ibom State. International Journal of Research and Scientific Innovation,2025:12(10):3081–3090. https://doi.org/10.51244/IJRSI.2025.1210000267

19. Jumere AA. Research methodology in education: A practical approach. Kaduna: Concept Designs and Prints, 2017.
20. Kolb DA. Experiential learning: Experience as the source of learning and development. Prentice Hall, 1984.
21. Musa A, Ibrahim Y. Digital transformation in technical and vocational education: A case for emerging technologies. Journal of Technical Innovations,2022:17(1):56–72.
22. National Board for Technical Education (NBTE). National Policy on Technical and Vocational Education and Training (TVET) in Nigeria. Abuja: Federal Ministry of Education, 2022.
23. Nworgu BG. Educational Research: Basic issues and methodology. 3rd ed. Enugu: University Trust Publishers, Nsukka Nigeria University System Statistic Digest, 2015.
24. Obi G, Onu P. The relationship between workshop facilities and technical competencies. Nigerian Journal of Industrial Training,2020:12(3):203–219.
25. Ogbu JP, Adamu HM. The relationship between workshop facilities and students' skill acquisition in technical education. Nigerian Journal of Technical Education,2020:11(4):201–218.
26. Okeke CJ. Bridging the gap between theory and practice: The need for improved workshop facilities in Nigerian Technical Colleges. West African Journal of Technical Education,2021:12(5):56–72.
27. Okolie U, Igwe P, Elom E. Improving graduate outcomes for Technical Colleges in Nigeria. Australian Journal of Career Development,2019:28(1):21–30.
28. Okoye R, Okwelle P. Enhancing TVET infrastructure for skill acquisition: A case study of Nigerian Technical Colleges. Journal of Technical and Vocational Studies,2021:10(2):78–94.
29. Okwelle PC, Owo OT. Skills Acquisition in Technical and Vocational Education and Training (TVET) tool for sustainable Entrepreneurship Development. Electrical/Electronic Students in Polytechnic. Rivers State Science and Industrial Technology Education Journal,2017:5(2):73–83.
30. Olaitan P. Workshop facility inadequacy and its impact on skill development in Nigerian Technical Colleges. International Journal of Educational Research,2021:15(3):119–136.
31. Olawale A, Ajibola T. Alternative funding models for TVET institutions in Nigeria. African Journal of Economic Policy,2021:8(2):72–88.
32. Parmar RS. Welding engineering and technology. Khanna Publishers, New Delhi, 2013.
33. Peter EO, Okpa JT, Okoi ON. Educational Support Services and Teachers' Job Performance in Secondary Schools in Akwa Ibom State, Nigeria. Journal of Educational System,2020:4(1):22–29.
34. UNESCO. Transforming TVET for sustainable development: Global perspectives and Nigerian experiences. Paris, France: UNESCO Publishing, 2022.
35. UNESCO. Technical and vocational education and training: Global trends and developments. Paris: UNESCO Publishing, 2021.