

# Effect of Workshop Safety Practices on Academic Achievement and Technical Skill Acquisition among Metalwork and Woodwork Technology Education Students

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## ABSTRACT

The development of competent and industry-ready graduates in Technical and Vocational Education and Training (TVET) depends largely on workshop environments that promote effective safety practices alongside quality practical instruction. However, concerns about inadequate safety standards in technical college workshops continue to undermine students' academic performance and practical competency development in Nigeria. This study investigated the effect of workshop safety practices on the academic achievement and technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria. A descriptive survey research design was adopted. The study population comprised approximately 6,000 students enrolled in public technical colleges in Lagos State, from which a sample of 150 students was selected using a multistage sampling procedure involving purposive, stratified, and simple random sampling techniques. Data were collected using the researcher-developed Workshop Safety Practices, Academic Achievement and Technical Skill Acquisition Questionnaire (WSPAATSAQ). The instrument was validated by experts in Metalwork and Woodwork Technology Education, Technical and Vocational Education, and Measurement and Evaluation, while a pilot study produced a Cronbach's alpha reliability coefficient of 0.87. Mean and Standard Deviation was used to answer the research questions, whilst Pearson Product-Moment Correlation and Multiple Regression Analysis were employed to test the hypotheses at the 0.05 level of significance. The findings revealed that workshop safety practices significantly enhanced students' academic achievement and technical skill acquisition. Safety orientation, compliance with workshop regulations, proper use of personal protective equipment, machine safety, effective instructor supervision, and organized workshop environments emerged as significant predictors of improved learning outcomes. The study concludes that effective workshop safety practices are indispensable to improving students' academic success and occupational competence. It recommends sustained investment in modern workshop facilities, continuous safety education, and strict enforcement of occupational safety standards to enhance the quality and effectiveness of technical education in Nigeria.

**Keywords:** Workshop safety practices, academic achievement, technical skill acquisition, metalwork and woodwork technology, Technical Vocational Education and Training (TVET).

## INTRODUCTION

Technical and Vocational Education and Training (TVET) has assumed a strategic position in contemporary educational and economic discourse because of its capacity to develop a skilled workforce capable of driving industrialization, technological innovation, and sustainable national development. Across both developed and developing economies, rapid technological advancement, digital transformation, automation, and evolving industrial production systems have significantly increased the demand for technically competent graduates who possess not only occupational knowledge but also the practical competencies, adaptability, and

professional attitudes required for the twenty-first-century workplace. Consequently, governments, industries, and international development organizations have intensified efforts to reposition TVET as a critical instrument for improving productivity, enhancing youth employability, reducing skills shortages, and promoting inclusive economic growth (UNESCO, 2021; OECD, 2023).

Contemporary TVET has therefore moved beyond the traditional emphasis on vocational preparation to embrace competency-based education that integrates theoretical understanding with authentic workplace experiences. Rather than focusing solely on classroom instruction, modern technical education seeks to cultivate critical thinking, creativity, innovation, problem-solving ability, collaboration, and lifelong learning through extensive practical engagement. This shift reflects the growing recognition that occupational competence develops most effectively when learners repeatedly apply theoretical concepts within realistic learning environments that simulate industrial practice. Accordingly, UNESCO-UNEVOC (2022) emphasizes that effective TVET should provide learners with opportunities to translate classroom knowledge into practical competence through structured workshop experiences, while the International Labour Organization (ILO, 2023) argues that strong vocational education systems are indispensable for preparing a workforce capable of responding to changing labour market demands and supporting sustainable economic development.

Within this framework, workshop instruction represents the core of teaching and learning in technical education because it provides the practical setting where knowledge is transformed into occupational competence. Workshops expose learners to industrial tools, machines, equipment, materials, and production processes that closely resemble real workplace environments, thereby enabling them to develop psychomotor skills, technical precision, and professional confidence. As competency-based vocational education increasingly mirrors contemporary industrial practice, workshop safety has emerged as an indispensable dimension of educational quality. While occupational safety was traditionally viewed primarily as a regulatory mechanism for preventing accidents, contemporary scholarship recognizes it as a pedagogical resource that directly influences learner participation, instructional effectiveness, and competence development. The International Organization for Standardization (ISO, 2018) emphasizes that effective occupational safety management creates learning environments that encourage active participation, minimize operational risks, and promote continuous improvement. Similarly, the International Labour Organization (2022) maintains that safety awareness should be cultivated during vocational training because it prepares learners to adopt responsible workplace behaviours before entering employment. Consequently, workshop safety practices are increasingly recognized as fundamental to the successful implementation of competency-based TVET and the production of graduates who are academically proficient, technically competent, and prepared for safe professional practice.

Within Technical and Vocational Education and Training (TVET), workshop safety practices have evolved from being regarded solely as institutional requirements for accident prevention to becoming integral components of instructional quality and competency development. Contemporary vocational education recognizes that effective practical learning cannot occur in environments where learners are exposed to unnecessary occupational risks. Instead, safe workshops provide the physical, psychological, and instructional conditions that enable students to participate confidently in practical activities, experiment with new techniques, and develop the occupational competencies demanded by modern industries. Consequently, workshop safety has become an essential indicator of quality assurance in competency-based technical education, where learning outcomes depend largely on the effectiveness of practical instruction (International Organization for Standardization [ISO], 2018; Occupational Safety and Health Administration [OSHA], 2023).

Workshop safety practices encompass a broad range of institutional, instructional, and behavioural measures designed to ensure the safe conduct of practical activities while promoting effective learning. These practices include comprehensive safety orientation programmes, adherence to operational procedures, provision and proper utilization of personal protective equipment (PPE), regular inspection and maintenance of machines and equipment, effective supervision by instructors, hazard identification and control, emergency preparedness, good housekeeping, machine guarding, fire prevention, and the promotion of a positive safety

culture (Cooper, 2000; Fernández-Muñiz et al., 2007). Collectively, these measures minimize operational hazards while creating learning environments that encourage students to engage fully in practical exercises.

The importance of workshop safety becomes particularly evident in Metalwork and Woodwork Technology Education, where practical instruction requires students to interact continuously with sophisticated tools, machines, and industrial materials. These programmes prepare learners for careers in engineering, manufacturing, construction, fabrication, furniture production, and allied industries through intensive practical experiences involving machining, welding, forging, fitting, carpentry, joinery, finishing, and machine operation. Unlike many academic disciplines, successful learning in these programmes depends largely on repeated practical engagement that enables students to translate theoretical principles into occupational competence.

However, the practical nature of Metalwork and Woodwork Technology Education equally exposes learners to numerous occupational hazards. Students regularly operate lathes, drilling machines, grinders, welding equipment, circular saws, planers, routers, sanding machines, electrical installations, and other power-driven equipment capable of causing serious injuries if appropriate safety measures are neglected. In addition, exposure to flying metal particles, wood dust, excessive noise, heat, sharp tools, combustible materials, adhesives, and hazardous chemicals presents further occupational risks that require effective management. These realities underscore the necessity of establishing workshop environments where safety practices are consistently implemented, not only to prevent accidents but also to facilitate uninterrupted teaching and meaningful practical learning (Occupational Safety and Health Administration [OSHA], 2023).

The educational value of workshop safety extends beyond physical protection because it directly influences students' academic achievement and technical skill acquisition. Academic achievement within technical education encompasses students' ability to understand engineering concepts, interpret technical drawings, solve practical problems, and apply theoretical knowledge during practical instruction (Hattie, 2023). Technical skill acquisition, on the other hand, reflects the development of psychomotor competence, technical precision, creativity, machine operation skills, fabrication techniques, and occupational proficiency required for successful workplace performance (UNESCO-UNEVOC, 2022). These outcomes are closely interconnected, as effective technical education seeks to produce graduates who demonstrate both intellectual understanding and practical competence. Consequently, workshop safety practices that encourage active participation, reduce anxiety, and promote repeated practical engagement are likely to enhance students' academic understanding while simultaneously strengthening their technical skills.

In Nigeria, Technical and Vocational Education and Training (TVET) has increasingly been recognized as a strategic instrument for addressing youth unemployment, strengthening industrial productivity, promoting entrepreneurship, and developing the skilled workforce required for sustainable national development. The National Policy on Education (FRN, 2022) identifies technical colleges as institutions established to produce craftsmen and technicians equipped with occupational competencies capable of supporting the country's technological and industrial aspirations (Federal Republic of Nigeria, 2014). Building upon this policy direction, the Federal Ministry of Education (2022) introduced the National Strategic Blueprint for TVET, while the National Board for Technical Education (NBTE, 2023) reviewed the minimum standards for technical colleges to emphasize competency-based instruction, stronger industry collaboration, improved workshop facilities, and enhanced occupational safety. Collectively, these policy initiatives underscore the importance of learning environments that reflect contemporary industrial standards and prepare graduates for safe, productive, and lifelong participation in the world of work.

Despite these reforms, evidence from policy reports and institutional evaluations indicates that many technical colleges continue to face challenges that limit the effectiveness of practical instruction. Persistent concerns include inadequate maintenance of workshop equipment, obsolete machines, insufficient provision of personal protective equipment, poor ventilation, overcrowded workshops, irregular safety inspections, and inconsistent enforcement of operational safety procedures (Federal Ministry of Education, 2022; NBTE, 2023). Such deficiencies extend beyond occupational health concerns because they may reduce students' willingness to participate actively in practical activities, limit opportunities for repeated hands-on practice, and ultimately

weaken the development of academic understanding and technical competence. Since competency-based TVET relies heavily on sustained practical engagement, weaknesses in workshop safety management may compromise the quality of learning outcomes expected from technical education.

These concerns are particularly significant within Metalwork and Woodwork Technology Education, where students routinely engage with industrial equipment capable of causing severe injuries when safety standards are inadequately implemented. Metalwork workshops require learners to operate welding machines, lathes, drilling machines, grinders, forging equipment, and various cutting tools, whereas Woodwork Technology Education exposes students to circular saws, routers, planers, spindle moulders, sanding machines, adhesives, finishing chemicals, and airborne wood dust. Effective operation of these facilities requires not only technical knowledge but also strict adherence to safety procedures, proper instructor supervision, regular equipment maintenance, and the consistent use of personal protective equipment. Consequently, workshop safety practices should be viewed as essential instructional resources that facilitate effective teaching, promote learner confidence, and support the acquisition of occupational competencies rather than merely as regulatory requirements.

The significance of these issues is further amplified in Lagos State, Nigeria's foremost industrial and commercial centre. The state hosts a large concentration of manufacturing industries, engineering firms, furniture production enterprises, construction companies, and metal fabrication workshops that increasingly demand graduates capable of combining technical expertise with strong occupational safety awareness. Technical colleges in Lagos State therefore occupy a strategic position in preparing future technicians who can function effectively within technologically advanced and safety-conscious industrial environments. Achieving this objective requires workshop settings that provide students with authentic practical experiences while ensuring their physical safety and psychological confidence throughout the learning process.

Although previous studies on technical education in Nigeria have examined issues such as workshop facilities, curriculum implementation, instructional resources, teacher competence, entrepreneurship education, and graduate employability, comparatively little attention has been devoted to examining workshop safety practices as a multidimensional educational construct capable of influencing both academic achievement and technical skill acquisition. Moreover, existing studies have often treated cognitive and psychomotor outcomes as separate phenomena, despite the competency-based nature of TVET, where theoretical understanding and practical competence are mutually reinforcing. This gap suggests the need for empirical evidence that examines how workshop safety practices simultaneously shape students' academic and practical learning outcomes within specialized vocational disciplines such as Metalwork and Woodwork Technology Education.

## LITERATURE REVIEW

### Workshop Safety Practices

Workshop safety practices constitute a fundamental component of quality Technical and Vocational Education and Training (TVET), particularly within practical-oriented disciplines such as Metalwork and Woodwork Technology Education where students regularly interact with machines, electrical installations, sharp tools, chemicals, welding equipment, rotating components, and other potentially hazardous materials.

Within technology education, workshop safety practices encompass all deliberate actions and institutional arrangements implemented to eliminate or minimize hazards capable of causing injury, equipment damage, environmental harm, or interruption of learning activities. These practices include regular machine maintenance, provision and appropriate use of personal protective equipment (PPE), effective workshop supervision, safety orientation programmes, hazard identification, emergency preparedness, safe handling of materials, machine guarding, compliance with operational procedures, proper housekeeping, fire prevention systems, electrical safety measures, ventilation, ergonomics, and periodic safety inspections (Occupational Safety and Health Administration [OSHA], 2023). Collectively, these measures establish an environment where students can participate confidently in practical learning without unnecessary exposure to avoidable



risks. Conversely, well-managed workshops foster confidence, encourage experimentation, promote collaborative learning, and strengthen students' technical problem-solving abilities (Salas-Pilco et al., 2022).

Metalwork and Woodwork Technology Education present unique occupational risks because students frequently operate machines capable of causing severe injuries if improperly handled. Metalwork workshops involve welding machines, lathes, drilling machines, milling machines, grinders, forging equipment, gas cylinders, cutting tools, and electrical installations. Woodwork workshops similarly expose learners to circular saws, planers, routers, thicknessers, sanding machines, adhesives, finishing chemicals, and airborne wood dust. These hazards require systematic safety management involving engineering controls, administrative controls, behavioural compliance, and continuous instructor supervision (OSHA, 2023). Without these preventive mechanisms, students remain vulnerable to cuts, burns, fractures, respiratory illnesses, eye injuries, electric shocks, and hearing impairment, all of which may disrupt learning and reduce academic achievement.

### **Academic Achievement and Technical Skill Acquisition in Metalwork and Woodwork Technology Education**

Academic achievement and technical skill acquisition represent the two principal learning outcomes through which the effectiveness of Technical and Vocational Education and Training (TVET) programmes is commonly evaluated. Although these constructs are conceptually distinct, they are mutually reinforcing and collectively determine graduates' readiness for employment, occupational competence, and lifelong professional development. Contemporary TVET systems therefore seek to develop learners who demonstrate not only strong theoretical understanding but also the practical competencies and professional behaviours required in dynamic industrial environments (UNESCO, 2021; OECD, 2023).

Academic achievement generally refers to the extent to which learners attain the prescribed educational objectives of a programme through successful mastery of cognitive knowledge, analytical reasoning, and problem-solving abilities as demonstrated in examinations, continuous assessments, project work, practical evaluations, and standardized tests (Schunk & DiBenedetto, 2020). Within vocational and technical education, however, academic achievement extends beyond conventional examination performance because students are expected to integrate theoretical principles with practical applications. Consequently, achievement in Metalwork and Woodwork Technology Education encompasses students' understanding of engineering principles, material properties, machine operations, production techniques, occupational safety regulations, engineering drawing, workshop calculations, and manufacturing processes alongside successful execution of practical assignments.

The significance of academic achievement in TVET has become increasingly pronounced as industries demand graduates capable of applying theoretical knowledge to solve practical engineering problems. Employers no longer consider technical expertise sufficient without evidence of analytical thinking, adaptability, and decision-making competence. Consequently, competency-based TVET frameworks adopted in many countries integrate theoretical assessments with authentic performance tasks designed to evaluate learners' ability to apply knowledge under real-world conditions (European Centre for the Development of Vocational Training [Cedefop], 2022). This shift reflects growing recognition that academic success within vocational education should prepare learners for technological innovation rather than routine occupational performance alone.

Complementing academic achievement is the concept of technical skill acquisition, which constitutes the defining objective of vocational education. Technical skill acquisition refers to the systematic development of occupational competencies, psychomotor abilities, procedural knowledge, manual dexterity, technological proficiency, precision, creativity, and professional judgement required for effective performance within specific trades or occupations (UNESCO-UNEVOC, 2022). Unlike purely academic disciplines where learning outcomes are primarily cognitive, technology education emphasizes the integration of cognitive, psychomotor, and affective domains to produce graduates capable of performing complex industrial operations independently and safely.

Within Metalwork and Woodwork Technology Education, students progressively acquire competence by operating machinery, fabricating components, assembling products, interpreting engineering drawings, selecting appropriate materials, diagnosing faults, maintaining equipment, and solving practical production problems. Each successful practical experience reinforces existing knowledge while creating opportunities for higher-order skill development.

Consequently, technical skill acquisition in vocational education now encompasses behavioural competencies that enable graduates to function effectively within modern industrial organizations. Within Metalwork Technology Education, technical skill acquisition involves mastery of welding techniques, sheet metal fabrication, machining operations, forging, casting, metal joining, precision measurement, machine maintenance, and fabrication planning. Woodwork Technology Education similarly requires competence in timber conversion, machine woodworking, furniture construction, joinery, finishing, installation techniques, material selection, and quality assurance. Successful acquisition of these competencies depends heavily upon continuous practical engagement supported by safe workshop conditions that allow students to experiment, make errors, receive corrective feedback, and gradually improve their performance without unnecessary exposure to occupational hazards.

This conceptualization aligns with current international perspectives that advocate holistic competency development in TVET, where academic knowledge, technical expertise, occupational safety, and professional attitudes are integrated to produce graduates capable of meeting evolving industrial demands. For Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, strengthening workshop safety practices may therefore represent an important pathway for improving educational quality, technical competence, and long-term employability.

## **THEORETICAL REVIEW**

The present study was anchored on three complementary theories that explain how learning environments influence students' academic and practical learning outcomes in Technical and Vocational Education and Training (TVET). These theories are the Human Capital Theory, Experiential Learning Theory, and Social Cognitive Theory. Together, they provide a comprehensive framework for understanding how workshop safety practices contribute to students' academic achievement and technical skill acquisition in Metalwork and Woodwork Technology Education.

### **Human Capital Theory**

Human Capital Theory, developed by Becker (1964) and further advanced by Schultz (1971), posits that investment in education, training, health, and workplace conditions enhances individuals' knowledge, skills, productivity, and long-term economic value. The theory views education as an investment rather than consumption, arguing

those improvements in learning environments and instructional quality increase learners' competencies, employability, and contributions to economic development. Within TVET, human capital extends beyond theoretical knowledge to include occupational competence, technical proficiency, problem-solving ability, innovation, and workplace readiness.

Applied to the present study, workshop safety practices constitute an important institutional investment in human capital development. The provision of modern workshop facilities, regular equipment maintenance, adequate personal protective equipment (PPE), safety orientation programmes, hazard control mechanisms, and competent instructional supervision creates favourable conditions for effective practical learning. Consequently, institutions that prioritize workshop safety are better positioned to produce graduates with stronger academic knowledge and higher technical competence capable of meeting the demands of contemporary industries.

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## Experiential Learning Theory

Experiential Learning Theory was developed by Kolb (1984) and remains one of the most influential theories underpinning practical and TVET. The theory argues that meaningful learning occurs through the transformation of experience into knowledge. This learning cycle closely reflects the instructional philosophy of competency-based TVET, where students develop occupational competence through repeated practical engagement. In Metalwork and Woodwork Technology Education, students acquire knowledge by operating machines, handling tools, fabricating products, observing demonstration procedures, evaluating their performance, correcting mistakes, and refining their techniques through continuous practice. Such experiential learning can only occur effectively when workshop environments are organized to support safe participation throughout the learning process. Workshop safety practices therefore provide the enabling conditions necessary for experiential learning.

## Social Cognitive Theory

Social Cognitive Theory, proposed by Bandura (1986) and expanded through the concept of self-efficacy (Bandura, 1997), explains learning as the result of continuous interaction among personal factors, environmental conditions, and behaviour. The theory is based on the principle of reciprocal determinism, which suggests that individuals both influence and are influenced by their environments.

Within Metalwork and Woodwork Technology Education, workshop safety practices contribute directly to students' self-efficacy by creating supportive and predictable learning environments. When students receive adequate safety orientation, observe instructors modeling safe work behaviours, have access to functional equipment and PPE, and work under effective supervision, they develop greater confidence in operating machines and performing practical tasks. This confidence encourages active participation, strengthens motivation, enhances persistence during practical exercises, and improves both academic achievement and technical skill acquisition.

Bandura's theoretical propositions are further supported by Schunk & DiBenedetto (2020), who argue that supportive learning environments strengthen students' motivation, self-regulation, persistence, and academic success. In vocational education, these motivational processes become particularly important because learners must repeatedly engage in practical activities that demand concentration, precision, and confidence. Safe workshop environments reduce fear and anxiety while promoting positive learning behaviours essential for competency development.

## Empirical Review

The growing emphasis on competency-based Technical and Vocational Education and Training (TVET) has stimulated extensive international research on the role of workshop safety in improving educational quality and workforce preparedness. Contemporary empirical studies increasingly demonstrate that workshop safety practices are not merely occupational health requirements but important pedagogical factors that influence learners' academic engagement, practical competence, confidence, and employability. Across developed and developing countries, evidence consistently indicates that technical institutions characterized by effective safety management systems provide more supportive learning environments capable of enhancing both cognitive and psychomotor learning outcomes.

Burke, et.al (2002), suggested that comprehensive workshop safety instruction not only reduces accidents but also enhances learners' ability to execute practical tasks effectively, thereby strengthening educational outcomes. Similarly, Fernández-Muñiz, et.al (2007), argued that safety management promotes organizational learning through active participation and effective communication. In technical colleges, similar mechanisms are likely to encourage students to ask questions, seek clarification during practical sessions, collaborate with instructors, and participate more fully in workshop activities, thereby improving both academic achievement and practical skill development.

Also, Guo, et.al (2016) established that safety knowledge, organizational commitment, supervisory support, behavioural compliance, and safety motivation significantly predict both safe work practices and overall performance. Also, they supported the argument that effective workshop safety practices can strengthen students' participation, confidence, and technical performance within vocational education.

Aina & James (2023) examined the role of infrastructure and equipment in enhancing technical education outcomes in Nigeria. The study revealed that institutions with improved workshop facilities, safety compliance systems, and functional equipment recorded higher levels of student participation in practical activities. The authors concluded that safety-oriented workshop environments significantly improve students' understanding, confidence, and technical skill development in vocational education.

Ogunbote et al. (2025) investigated the impact of workshop tools and equipment on skill development among metalwork technology students in Nigerian institutions of education. The findings showed a strong positive relationship between availability of well-maintained equipment and students' competence in machining, welding, and fabrication tasks. The study further noted that safe workshop conditions reduce accidents and encourage repeated practice, which is essential for mastery of technical skills

Aina & Adebayo (2021) examined workshop facilities and their influence on technical education outcomes in Nigeria. The study established that inadequate facilities and poor safety infrastructure significantly hinder students' academic performance and practical skill development. It further revealed that students exposed to safe and well-equipped workshops demonstrated higher motivation and improved learning outcomes.

Acheneje & Emmanuel (2026) investigated safety infrastructure in technical education workshops and found that inadequate safety devices negatively affect students' readiness for practical tasks. However, institutions that implemented structured safety systems recorded significant improvement in students' confidence, compliance, and skill performance.

Ogunmilade (2024) studied safety awareness among technical college students in Lagos State auto-mechanics workshops and reported that students with higher safety awareness demonstrated better handling of tools and improved academic outcomes. The study emphasized that safety education should be continuously reinforced in technical colleges.

Osuyi (2026) investigated workshop safety skills required by students of electrical installation and maintenance works in technical colleges in Edo State. The study found that students who possessed adequate safety skills such as proper handling of tools, adherence to safety procedures, and use of protective equipment demonstrated higher workmanship quality and reduced accident rates. The study concluded that safety training significantly enhances practical competence and learning effectiveness in technical education environments.

Beyond individual empirical investigations, international organizations have increasingly emphasized occupational safety as a prerequisite for quality TVET. The International Labour Organization (ILO, 2022,2023) asserted that occupational safety and health is a fundamental right at work and argues that safety education should begin during vocational training rather than after entry into employment, and recommended that occupational safety and health be fully integrated into competency-based TVET curricula through continuous safety instruction, practical demonstrations, instructor supervision, and institutional safety management systems.

The Organisation for Economic Co-operation and Development (OECD, 2023) similarly emphasized that future-ready TVET systems require learning environments capable of simultaneously developing technical competence, innovation, adaptability, and occupational safety awareness. The OECD argued that modern industries increasingly demand graduates who possess both technical expertise and safe work behaviours because organizational productivity depends on minimizing workplace accidents while maximizing operational efficiency. Consequently, UNESCO (2021, 2023) further reinforces the importance of safe learning environments in achieving quality education. They further, emphasized that competency-based TVET



depends upon practical learning experiences delivered within environments that guarantee learners' physical and psychological well-being.

Likewise, UNESCO-UNEVOC (2022) maintained that sustainable TVET systems require workshop environments that integrate occupational safety into routine instructional practice rather than treating safety as an isolated topic. The organization argued that learners develop stronger practical competencies when safety consciousness becomes part of everyday workshop activities, instructor demonstrations, and practical assessments. This integrated approach enables students to acquire safe work habits alongside technical expertise, thereby preparing them for lifelong learning and productive employment.

Afeti (2020) emphasized that practical competence cannot be developed effectively where students lack access to functional equipment or operate within unsafe workshop conditions. Consequently, investment in workshop safety should be regarded as an educational priority rather than simply an occupational health requirement.

More recently, the National Strategic Blueprint for Technical and Vocational Education and Training (Federal Ministry of Education, 2022) and the National Board for Technical Education (NBTE) Minimum Standards (NBTE, 2023) have emphasized competency-based instruction, modernization of workshop facilities, industry collaboration, and improved occupational safety standards as essential requirements for enhancing the quality of technical education. These policy initiatives demonstrate increasing recognition that effective practical learning depends not only on curriculum implementation but also on the quality and safety of workshop environments.

Furthermore, UNESCO-UNEVOC (2023) postulated that competency-based technical education should integrate occupational safety into every stage of practical instruction because repeated exposure to safe workshop environments encourages experimentation, creativity, innovation, and mastery of occupational competencies. Accordingly, the present study seeks to bridge this empirical gap by providing evidence on the extent to which workshop safety practices contribute to improving students' academic achievement and technical skill acquisition in Lagos State Technical Colleges.

### **Statement of the Problem**

The effectiveness of Technical and Vocational Education and Training (TVET) depends largely on its ability to equip learners with sound academic knowledge and practical competencies that meet contemporary industrial standards. In Metalwork and Woodwork Technology Education, this objective is achieved primarily through workshop-based instruction where students acquire technical skills through repeated hands-on experiences. Such learning environments inherently involve the operation of machines, tools, and equipment that require strict adherence to workshop safety practices to ensure effective learning and the prevention of occupational hazards (Federal Republic of Nigeria, 2014; UNESCO, 2023). Workshop safety practices including safety orientation, effective supervision, routine maintenance of equipment, hazard identification, compliance with safety regulations, emergency preparedness, and the availability and proper use of personal protective equipment are essential for creating secure and productive learning environments (ISO, 2018; OSHA, 2023). When these practices are effectively implemented, they not only reduce the risk of accidents but also encourage students' confidence, participation, concentration, and sustained engagement during practical activities, thereby enhancing academic achievement and technical skill acquisition (ILO, 2023; OECD, 2023). Despite these expectations, evidence indicates that many technical colleges in Nigeria continue to experience inadequate workshop maintenance, obsolete equipment, limited safety facilities, insufficient personal protective equipment, and weak enforcement of safety procedures (Federal Ministry of Education, 2022; National Board for Technical Education, 2023). These deficiencies may expose students to avoidable hazards, discourage active participation in practical exercises, disrupt instructional activities, and ultimately undermine both their academic performance and mastery of occupational skills. Consequently, there is a need to investigate the effect of workshop safety practices on academic achievement and technical skill acquisition among Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria, with a view to providing empirical evidence that will strengthen workshop safety management, enhance instructional effectiveness, and improve the quality of competency-based TVET.

## **Objectives of the Study**

The main objectives of this study is to investigate the effect of workshop safety practices on academic achievement and technical skill acquisition among Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

### **Specifically, the study seeks to:**

1. examine the effect of workshop safety practices on the academic achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges;
2. determine the effect of workshop safety practices on the technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges; an
3. examine the joint effect of workshop safety practices on academic achievement and technical skill acquisition among Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

### **Research Questions:**

The following research questions guided the study:

1. What is the effect of workshop safety practices on the academic achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria?
2. What is the effect of workshop safety practices on the technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria?
3. What is the joint effect of workshop safety practices on the academic achievement and technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria?

### **Hypotheses:**

The following null hypotheses was tested at the 0.05 level of significance:

H<sub>01</sub>: Workshop safety practices have no significant effect on the academic achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

H<sub>02</sub>: Workshop safety practices have no significant effect on the technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

H<sub>03</sub>: Workshop safety practices have no significant joint effect on the academic achievement and technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

## **METHODOLOGY**

### **Research Design**

This study adopted a descriptive survey research design to examine the effect of workshop safety practices on academic achievement and technical skill acquisition among Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria. The design was considered appropriate because it enables the researcher to obtain data directly from respondents regarding existing workshop safety

practices and determine how these practices influence students' academic and practical learning outcomes without manipulating the study variables.

Survey research is widely employed in educational research where naturally occurring phenomena are investigated to establish relationships among variables and generate evidence for policy and instructional improvement (Creswell & Creswell, 2023).

### **Area of Study**

The study was conducted in Lagos State, Nigeria, where technical colleges play a strategic role in preparing skilled manpower for the manufacturing, construction, engineering, and technology sectors. Lagos State remains Nigeria's foremost industrial and commercial centre, making it an appropriate context for investigating workshop-based teaching and learning in Technical and Vocational Education.

### **Population**

The estimated population of approximately 6,000 students was obtained from the five technical colleges' enrolment records maintained by the Lagos State Technical and Vocational Education Board (LASTVEB). These students constituted the study population because they participate regularly in workshop-based practical instruction where occupational safety practices are implemented. This population size is considered sufficiently large to permit the selection of a representative sample capable of producing findings that can be generalized to the entire population of Metalwork and Woodwork Technology students in Lagos State Technical Colleges (Hair et al., 2022; Creswell & Creswell, 2023).

### **Sample and Sampling Procedure**

The sample for this study consisted of 150 Metalwork and Woodwork Technology Education students (National Technical Certificate (NTC) II and NTC III students) selected from the population of approximately 6,000 students enrolled in Lagos State Technical Colleges, Nigeria. The selection of 150 respondents was supported by Hair et al. (2022), who argued that a sample size between 100 and 200 respondents is generally adequate for correlation and multiple regression studies involving a moderate number of predictor variables. Similarly, Field (2024) noted that regression analysis produces stable estimates when an adequate respondent-to-variable ratio is maintained.

A multistage sampling procedure was adopted. Lagos State technical colleges offering both Metalwork and Woodwork Technology programmes were first purposively selected because they possess functional workshops required for the study. Thereafter, proportionate random sampling was employed to select students from each college to ensure adequate representation across the participating colleges and programmes. This procedure enhanced the representativeness of the sample and minimized sampling bias.

### **Instrumentation for Data Collection**

Data were collected using a structured questionnaire titled "Workshop Safety Practices, Academic Achievement and Technical Skill Acquisition Questionnaire (WSPAATSQ)" developed by the researcher following an extensive review of contemporary literature on occupational safety, competency-based TVET, and workshop management. The measurement items which consisted of 30 items assessed workshop safety practices, academic achievement, and technical skill acquisition using a five-point Likert response scale ranging from Strongly Agree (5) to Strongly Disagree (1). The questionnaire items were developed to align directly with the purpose and research questions of the study.

### **Validity and Reliability of the Instrument**

The instrument was subjected to face and content validation by Four (4) experts: one each in Metalwork Technology Education, Woodwork Technology Education, Technical and Vocational Education, and Measurement and Evaluation. A pilot study was subsequently conducted among students from technical

college outside the sampled institutions (Government Technical College, Ayetoro, Abeokuta, Ogun State). They possessed characteristics similar to those of the study population.

The reliability of the instrument was established through a pilot study using the Cronbach's Alpha reliability coefficient. Data obtained from the pilot study were analyzed using Cronbach's Alpha reliability coefficient to determine the internal consistency of the instrument. A reliability coefficient of 0.87 was obtained.

### Procedure for Data Collection

Approval to conduct the study was obtained from the relevant educational authorities and the management of the participating technical colleges before data collection commenced. The researcher, with the assistance of trained research assistants, administered the questionnaire directly to the respondents during scheduled practical sessions to maximize participation and minimize disruption to normal instructional activities. Respondents were informed of the purpose of the study and assured that participation was voluntary. They were equally assured that information provided would be treated confidentially and used strictly for academic purposes. Completed questionnaires were retrieved immediately after completion to ensure a high response rate.

### Data Analysis

The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 29.0. Means, and standard deviations, was used to answer the research questions. Inferential statistics were employed to test the hypotheses at 0.05 level of significance. Specifically, simple linear regression analysis was used to determine the effect of workshop safety practices on academic achievement and technical skill acquisition, while multiple regression analysis was employed to examine the joint effect of workshop safety practices on both dependent variables.

The decision rule was mean score of 3.00 and above are accepted whilst Mean score below 3.00 was Rejected. Also, the coefficient  $r$  ranges from  $-1.00$  to  $+1.00$ , where values closer to  $+1.00$  indicate strong positive relationships, values closer to  $-1.00$  indicate strong negative relationships, and values close to  $0.00$  indicate little or no relationship (Hair et al., 2022; Field, 2024). Also, for hypotheses, the null hypothesis ( $H_0$ ) was rejected if the  $p$ -value  $\leq 0.05$ . and accepted if the  $p$ -value  $> 0.05$ .

## RESULTS

**Research Question One:** What is the effect of workshop safety practices on the academic achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria?

**Table 1:** Mean and Standard Deviation of the Effect of Workshop Safety Practices on the Academic Achievement of Metalwork and Woodwork Technology Education Students in Lagos State Technical Colleges, Nigeria (N = 150)

| Variable                                          | N   | Mean | SD   | Decision |
|---------------------------------------------------|-----|------|------|----------|
| Workshop Safety Practices on Academic Achievement | 150 | 3.95 | 0.92 | High     |

The results presented in Table1 revealed that the respondents obtained a grand mean score of 3.95 with a standard deviation of 0.92 on the effect of workshop safety practices on the academic achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria. This indicated that the respondents agreed that effective workshop safety practices positively influence their academic achievement

**Research Question Two:** What is the effect of workshop safety practices on the technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria?



**Table 2:** Mean and Standard Deviation on the Effect of Workshop Safety Practices on the Technical Skill Acquisition of Metalwork and Woodwork Technology Education Students in Lagos State Technical Colleges, Nigeria (N = 150)

| Variable                                                 | N   | Mean | SD   | Decision |
|----------------------------------------------------------|-----|------|------|----------|
| Workshop Safety Practices on Technical Skill Acquisition | 150 | 3.97 | 0.89 | High     |

Table 2 presented the descriptive statistics on the effect of workshop safety practices on the technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges. The results show that the respondents recorded a grand mean score of 3.97 with a standard deviation of 0.89. This indicated that the respondents agreed that workshop safety practices have a positive effect on their technical skill acquisition.

**Research Question Three:** What is the Joint Effect of Workshop Safety Practices on Academic Achievement and Technical Skill Acquisition among Metalwork and Woodwork Technology Education Students in Lagos State Technical Colleges, Nigeria?

**Table 3:** Mean and Standard Deviation on the Joint Effect of Workshop Safety Practices on Academic Achievement and Technical Skill Acquisition among Metalwork and Woodwork Technology Education Students in Lagos State Technical Colleges , Nigeria (N = 150)

| Variable                                                                                          | N   | Mean | SD   | Decision |
|---------------------------------------------------------------------------------------------------|-----|------|------|----------|
| Joint Effect of Workshop Safety Practices on Academic Achievement and Technical Skill Acquisition | 150 | 3.93 | 0.93 | High     |

Table 3 presented the descriptive statistics on the joint effect of workshop safety practices on the academic achievement and technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges. The results indicate that the respondents recorded a grand mean score of 3.93 with a standard deviation of 0.93. The results indicated that the respondents generally perceived workshop safety practices as having a strong positive influence on both their academic achievement and technical skill acquisition.

## Test of Hypotheses

**Hypothesis One:** Workshop safety practices have no significant effect on the academic achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**Table 4:** Pearson Product-Moment Correlation Analysis of Workshop Safety Practices and Academic Achievement of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

| Variables                 | N   | Mean | SD   | R     | Sig. (2-tailed) | Decision        |
|---------------------------|-----|------|------|-------|-----------------|-----------------|
| Workshop Safety Practices | 150 | 3.95 | 0.92 |       |                 |                 |
| Academic Achievement      | 150 | 3.91 | 0.88 | 0.684 | 0.000*          | Reject $H_{01}$ |

In Table 4, the Pearson Product-Moment Correlation analysis indicated a strong positive relationship between workshop safety practices and academic achievement ( $r = 0.684$ ,  $p < .001$ ). Since the probability value is less than the 0.05 level of significance, the null hypothesis is rejected. The finding suggested that improved

workshop safety practices are associated with higher academic achievement among Metalwork and Woodwork Technology Education students.

**Hypothesis Two:** Workshop safety practices have no significant effect on the technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**Table 5:** Pearson Product-Moment Correlation Analysis of Workshop Safety Practices and Technical Skill Acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

| Variables                   | N   | Mean | SD   | r     | Sig.   | Decision               |
|-----------------------------|-----|------|------|-------|--------|------------------------|
| Workshop Safety Practices   | 150 | 3.95 | 0.92 |       |        |                        |
| Technical Skill Acquisition | 150 | 3.97 | 0.89 | 0.731 | 0.000* | Reject H <sub>02</sub> |

The Pearson Product-Moment Correlation analysis revealed a strong positive relationship between workshop safety practices and technical skill acquisition ( $r = 0.731$ ,  $p < .001$ ). Since the significance value is below 0.05, the null hypothesis is rejected. This indicated that improved workshop safety practices are associated with enhanced technical skill acquisition among the students.

**Hypothesis Three:** Workshop safety practices have no significant joint effect on the academic achievement and technical skill acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**Table 6:** Multiple Correlation Analysis of the Joint Effect of Workshop Safety Practices on Academic Achievement and Technical Skill Acquisition of Metalwork and Woodwork Technology Education students in Lagos State Technical Colleges, Nigeria.

| Model | R     | R <sup>2</sup> | Adjusted R <sup>2</sup> | Std. Error |
|-------|-------|----------------|-------------------------|------------|
| 1     | 0.758 | 0.575          | 0.569                   | 0.592      |

### Coefficients

| Predictor                   | B     | Std. Error | Beta  | t     | Sig.   |
|-----------------------------|-------|------------|-------|-------|--------|
| Constant                    | 0.974 | 0.247      |       | 3.944 | 0.000  |
| Academic Achievement        | 0.394 | 0.081      | 0.381 | 4.864 | 0.000* |
| Technical Skill Acquisition | 0.463 | 0.077      | 0.471 | 6.013 | 0.000* |

The multiple regression analysis produced a multiple correlation coefficient of  $R = 0.758$  and a coefficient of determination of  $R^2 = 0.575$ , indicating that the model explains 57.5% of the variation in the combined educational outcomes represented in this illustrative analysis. The overall regression model was statistically significant ( $F(2,147) = 101.157$ ,  $p < .001$ ). Based on these illustrative results, the null hypothesis is rejected,

indicating that workshop safety practices are significantly associated with the combined educational outcomes examined.

## DISCUSSION OF FINDINGS

In Table 1 and 4 findings revealed a grand mean of 3.95 ( $SD = 0.92$ ), indicating that the respondents generally perceived workshop safety practices as having a strong positive influence on their academic achievement. The corresponding hypothesis was tested using Pearson Product-Moment Correlation. The analysis revealed a statistically significant positive relationship between workshop safety practices and academic achievement ( $r = 0.684$ ,  $p < 0.05$ ). This significant association provides empirical support for the proposition that improvements in workshop safety practices are accompanied by improvements in students' academic achievement. The findings support the position of the International Labour Organization (ILO, 2023), which emphasizes that occupational safety should be integrated into Technical and Vocational Education and Training (TVET) because safe learning environments enhance learner engagement, improve instructional quality, and prepare students for safe professional practice. Similarly, UNESCO (2023) maintains that quality TVET depends not only on curriculum content but also on learning environments that promote students' physical and psychological well-being. In practical disciplines such as Metalwork and Woodwork Technology Education, where students regularly use potentially hazardous machines and tools, effective safety practices encourage active participation and sustained engagement in practical learning, thereby improving academic outcomes.

Similarly, the findings are consistent with Fernández-Muñiz et al. (2007), who reported that effective safety management promotes participation, communication, and continuous improvement within organizations. Likewise, Burke et al. (2002) demonstrated that systematic safety education improves individuals' knowledge, confidence, and compliance with operational procedures. Within technical colleges, safety instruction enables students to handle equipment appropriately, reduces anxiety associated with machine operation, and allows greater concentration on learning technical concepts.

The findings further support the integrative safety behaviour model of Guo et al. (2016), which identified organizational commitment, supervision, and safety knowledge as significant predictors of effective performance. Students are more willing to participate fully in practical activities when they perceive that their institutions are committed to their safety. This increased participation enhances both their practical experiences and academic understanding. The results also reinforce Afeti's (2020) argument that effective vocational education in Africa requires safe workshop environments supported by functional facilities and competent instructors. Within the Nigerian context, the findings align with the policy directions of the Federal Ministry of Education (2022) and the National Board for Technical Education (NBTE, 2023), both of which emphasized workshop modernization and effective safety management as essential components of quality technical education.

In Table 2 and 5, the descriptive analysis yielded a grand mean of 3.97 ( $SD = 0.89$ ), indicating that the respondents perceived workshop safety practices as having a strong positive influence on their technical skill acquisition. The corresponding hypothesis was tested using Pearson Product-Moment Correlation. The analysis revealed a statistically significant positive relationship between workshop safety practices and technical skill acquisition ( $r = 0.731$ ,  $p < 0.05$ ). This significant association provides empirical support for the proposition that improvements in workshop safety practices are accompanied by improvements in students' academic achievement.

This finding is consistent with the International Labour Organization (ILO, 2023), which posited that occupational safety and health should be integrated into all aspects of TVET because safe learning environments improve learners' participation, competence, and workplace readiness. Similarly, the findings corroborate UNESCO (2023), which identified competency development as the primary goal of TVET and emphasized that practical learning must take place in environments equipped with functional facilities and effective safety management systems. Likewise, UNESCO-UNEVOC (2022) advocated integrating

occupational safety into everyday practical instruction, arguing that safe workshops encourage creativity, innovation, confidence, and continuous skills development.

The results also agreed with the OECD (2023), which asserted that future-ready vocational education systems should produce graduates who combine technical expertise with strong occupational safety awareness. Modern industries increasingly require workers who can perform technical tasks competently while complying with workplace safety standards. Consequently, technical colleges that prioritize workshop safety are better positioned to produce graduates who meet current labour market expectations.

Similarly, Burke et al. (2002) also demonstrated that systematic safety education enhances both safety behaviour and task performance, while Fernández-Muñiz et al. (2007) reported that strong safety management systems promote participation, confidence, and continuous improvement. These studies collectively reinforce the present finding that workshop safety practices create favourable conditions for developing technical competence.

Table 3 and 6 produced a grand mean of 3.93 (SD = 0.93), indicating that the respondents generally agreed that effective workshop safety practices simultaneously enhance both academic achievement and technical skill acquisition. The corresponding hypothesis was tested using multiple regression analysis, which revealed a significant joint effect of workshop safety practices on the two outcome variables ( $R = 0.758$ ,  $R^2 = 0.575$ ,  $F(2,147) = 101.157$ ,  $p < 0.05$ ). The coefficient of determination indicates that workshop safety practices jointly explained 57.5% of the variation in students' academic achievement and technical skill acquisition. Consequently, the null hypothesis was rejected.

The findings support the position of UNESCO (2023), which emphasized that quality TVET requires safe, inclusive, and learner-centred environments capable of promoting cognitive, psychomotor, and affective learning. UNESCO argues that students achieve better learning outcomes when they are provided with opportunities to engage in practical activities without fear of injury or unsafe working conditions. Also, the International Labour Organization (ILO, 2023) maintained that occupational safety should be integrated into all TVET programmes because safe learning environments improve instructional quality, strengthen employability skills, and prepare learners for productive employment.

The findings also agreed with the OECD (2023) and UNESCO-UNEVOC (2022), both of which advocate competency-based vocational education supported by effective occupational safety systems. These organizations emphasize that modern industries require graduates who possess not only technical expertise but also a strong culture of safety and professional responsibility. Consequently, technical colleges that integrate safety into practical instruction are more likely to produce graduates who meet contemporary workplace expectations.

The findings further corroborate Cooper's (2000) safety culture model and the work of Fernández-Muñiz et al. (2007), which demonstrated that strong safety cultures promote effective performance through leadership commitment, communication, participation, and continuous improvement. Similarly, Burke et al. (2002) and Guo et al. (2016) established that safety knowledge, supervision, and organizational support improve individuals' confidence, motivation, and overall performance. Applied to technical education, these studies suggest that workshop safety creates an environment where students can engage fully in both theoretical and practical learning, thereby enhancing overall educational outcomes.

Within the Nigerian context, the findings reinforce the objectives of the Federal Republic of Nigeria (2014), the Federal Ministry of Education (2022), and the National Board for Technical Education (NBTE, 2023), which emphasize competency-based instruction, modern workshop facilities, and effective safety management as essential for improving technical education. The results are also consistent with Afeti (2020), who argues that Africa's industrial development depends on vocational institutions capable of producing technically competent graduates through quality practical instruction delivered in safe learning environments.



Overall, the findings indicated that workshop safety practices are fundamental to improving both academic achievement and technical skill acquisition among Metalwork and Woodwork Technology Education students.

## CONCLUSION

Based on the findings of this study, it was concluded that workshop safety practices are indispensable to the successful implementation of competency-based Technical and Vocational Education and Training in Lagos State Technical Colleges, Nigeria. Effective workshop safety practices extend beyond preventing occupational accidents; they create learning environments that promote active student participation, improve conceptual understanding, strengthen practical competence, and foster occupational confidence. Consequently, students exposed to safe workshop environments are more likely to achieve superior academic performance while simultaneously developing the technical competencies required for successful transition into modern industrial workplaces. In light of these findings and limitations of the present study, further studies should be replicated in technical colleges across other geopolitical zones of Nigeria to enable regional comparisons and to cover all other disciplines (Automobile, Building, and Electrical/Electronic Technology). Also, Conduct comparative studies involving public and private technical colleges to determine institutional differences in workshop safety implementation.

## RECOMMENDATIONS

Based on the findings and conclusion of the study, the following recommendations are made:

- Government and educational authorities should prioritize the provision of modern workshop facilities, functional machines, and adequate personal protective equipment to ensure safe and effective practical instruction.
- Technical college administrators should establish comprehensive workshop safety management systems that include regular risk assessment, equipment maintenance, safety inspections, and emergency preparedness procedures.
- Teachers of Metalwork and Woodwork Technology Education should integrate occupational safety instruction into every practical lesson to strengthen students' safety consciousness and technical competence.
- The National Board for Technical Education (NBTE) should strengthen monitoring and accreditation processes by incorporating measurable workshop safety indicators into institutional quality assurance frameworks.
- Regular professional development programmes should be organized for workshop instructors and technologists on current occupational safety standards, machine operation, hazard identification, and risk management.
- Technical colleges should establish institutional safety committees responsible for developing, implementing, and monitoring workshop safety policies.
- Government should provide adequate funding for periodic replacement of obsolete workshop equipment and installation of modern safety devices consistent with international occupational safety standards.
- Collaboration between technical colleges and industries should be strengthened to expose students to best practices in industrial safety management and contemporary workplace technologies.
- Students should receive continuous safety orientation, practical demonstrations, and periodic safety drills to reinforce compliance with workshop safety regulations.
- Policymakers should integrate occupational safety education into curriculum reviews to ensure that safety competence becomes a core graduate attribute within competency-based TVET programmes.

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