

# Assessing The Influence of Participation in the Students' Industrial Work Experience Scheme (SIWES) on Technical Competency and Employability Among Building and Metalwork Technology Education Students in Lagos State Technical Colleges, Nigeria

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## ABSTRACT

The Students' Industrial Work Experience Scheme (SIWES) is a key work-integrated learning programme designed to bridge the gap between classroom instruction and industrial practice in Technical and Vocational Education and Training (TVET). However, concerns persist regarding its effectiveness in developing technical competency and employability among students in Nigerian technical colleges. This study assessed the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on technical competency and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria. A descriptive correlational survey research design was adopted. The study population comprised approximately 6,000 students, from which 150 respondents were selected using a multistage sampling technique. Data were collected using the researcher-developed Students' Industrial Work Experience Scheme, Technical Competency and Employability Questionnaire (SIWESTCEQ). The instrument was validated by experts in Technical and Vocational Education, Building and Metalwork Technology Education, and Educational Measurement and Evaluation, while its reliability was established using a Cronbach's alpha coefficient of 0.70. Data were analysed using mean and standard deviation to answer the research questions, while Pearson Product-Moment Correlation and multiple regression analyses were employed to test the hypotheses at the 0.05 level of significance. The findings revealed that participation in SIWES significantly enhanced students' technical competency and employability by improving practical skills, occupational competence, communication, teamwork, adaptability, and professional confidence. The study concludes that effective SIWES participation strengthens workforce readiness and recommends closer collaboration among technical colleges, industries, employers, and the Industrial Training Fund to improve industrial training and graduate employability.

**Keywords:** Students' Industrial Work Experience Scheme (SIWES); Technical Competency; Employability; Building and Metalwork Technology; Technical and Vocational Education and Training (TVET).

## INTRODUCTION

Technical and Vocational Education and Training (TVET) is globally recognised as a critical driver of human capital development, industrial competitiveness, technological advancement, and sustainable economic growth. As economies become increasingly dependent on innovation, automation, digital technologies, and advanced production systems, the demand for technically competent and employable graduates has continued to increase. Consequently, educational institutions are expected to produce graduates who possess not only sound theoretical knowledge but also practical competencies, workplace experience, problem-solving abilities, and professional attitudes that enable them to function effectively in

dynamic industrial environments (UNESCO, 2021; International Labour Organization [ILO], 2022). In response to these expectations, competency-based education and work-integrated learning have become integral components of contemporary TVET systems because they bridge the gap between classroom instruction and the realities of the workplace. Within the Nigerian educational system, TVET occupies a strategic position in the development of skilled manpower required for national industrialisation, infrastructure development, technological innovation, and economic diversification. The National Policy on Education recognised technical colleges as institutions established to prepare skilled craftsmen and technicians capable of meeting the workforce needs of key sectors such as construction, manufacturing, fabrication, engineering, and allied industries (Federal Republic of Nigeria (FRN), 2014).

Building and Metalwork Technology Education are among the major vocational programmes offered in technical colleges, where students are expected to acquire occupational competencies in building construction, welding, fabrication, machining, maintenance, workshop practice, and related technical operations. These programmes are designed to develop graduates who are capable of securing gainful employment, creating self-employment opportunities, and contributing meaningfully to national development. Despite the recognised importance of TVET, concerns persist regarding the employability and technical competence of many graduates produced by technical institutions in Nigeria. Several studies have attributed this challenge to inadequate practical exposure, obsolete workshop facilities, insufficient instructional resources, weak collaboration between educational institutions and industries, and limited opportunities for students to engage with modern industrial technologies (UNESCO, 2021; ILO, 2022). Consequently, many employers continue to express concerns that graduates often possess satisfactory theoretical knowledge but lack the practical competencies, occupational confidence, and workplace readiness required for immediate employment. This mismatch between institutional training and labour market expectations has contributed to graduate unemployment, underemployment, and persistent skills shortages within Nigeria's technical and vocational sectors (World Bank, 2022; OECD, 2021).

To address these challenges, the Students' Industrial Work Experience Scheme (SIWES) was introduced as a structured work-integrated learning programme aimed at strengthening the practical component of technical and professional education in Nigeria. Established in 1973 by the Industrial Training Fund (ITF), SIWES was designed to expose students in engineering, technology, agriculture, science, education, and other professional disciplines to real industrial environments where they could apply classroom knowledge, acquire practical skills, and develop occupational competencies before graduation (Industrial Training Fund, 2023). The scheme provides students with supervised industrial attachment opportunities that enable them to gain hands-on experience using contemporary equipment, participate in real production activities, interact with experienced professionals, and understand workplace culture, ethics, and organisational practices. Through these experiences, SIWES serves as an important mechanism for integrating theoretical learning with industrial practice and preparing students for successful career transitions.

Globally, work-integrated learning has become an essential pedagogical approach for improving students' competence and employability. Unlike conventional classroom-based instruction, work-integrated learning provides authentic workplace experiences that enable learners to apply theoretical concepts to practical situations while developing technical expertise, critical thinking, communication, teamwork, adaptability, innovation, and professional judgement (Jackson, 2020). Employers increasingly regard these competencies as indispensable attributes for successful workplace performance in contemporary industries. Empirical evidence has consistently shown that students who participate in structured workplace learning programmes demonstrate greater occupational confidence, improved technical performance, stronger career readiness, and enhanced employability than those whose learning experiences are limited to institutional settings (Jackson, 2020; OECD, 2021). Participation in SIWES is particularly important for students of Building and Metalwork Technology Education because the competencies required in these disciplines are predominantly practice-oriented. Technical competency within these programmes extends beyond theoretical understanding to include proficiency in machine operation, welding and fabrication, building construction techniques, workshop safety practices, blueprint interpretation, measurement and estimation, equipment maintenance, quality control, material selection, troubleshooting, and project execution. The acquisition of these

competencies requires sustained engagement with real industrial equipment, production processes, construction sites, and experienced practitioners.

However, many technical colleges continue to face challenges such as inadequate workshop facilities, obsolete equipment, limited instructional materials, irregular maintenance of laboratories, and insufficient opportunities for practical industrial exposure (FRN, 2014; UNESCO, 2021). Consequently, participation in SIWES provides an important opportunity for students to complement classroom learning through authentic workplace experiences that strengthen technical competence and occupational confidence. Beyond technical competency, employability has emerged as one of the principal outcomes expected from technical and vocational education. Employability encompasses the combination of technical knowledge, transferable skills, professional values, personal attributes, and adaptive capabilities that enable graduates to obtain employment, perform effectively, progress in their careers, and respond successfully to changing workplace demands (ILO, 2022). Contemporary employers increasingly seek graduates who possess not only occupation-specific skills but also communication skills, teamwork, leadership, problem-solving ability, digital literacy, innovation, professionalism, entrepreneurial orientation, and adaptability. These competencies are difficult to develop solely through classroom instruction but are significantly enhanced through structured industrial experiences where students engage in real workplace tasks and interact with experienced professionals.

Consequently, participation in SIWES has been identified as an important strategy for improving graduates' employability by exposing them to workplace expectations, organisational culture, professional ethics, and industry best practices (Jackson, 2020). Building Technology Education and Metalwork Technology Education are strategically positioned within Nigeria's technical education system because they supply skilled manpower for the construction, manufacturing, engineering, fabrication, maintenance, and infrastructure sectors. Building Technology Education equips students with competencies in building construction, site management, structural maintenance, quantity estimation, and construction technology, while Metalwork Technology Education develops competencies in welding, machining, fabrication, foundry operations, sheet metal work, and manufacturing processes. These sectors continue to experience rapid technological changes driven by automation, computer-aided manufacturing, modern construction techniques, and digital production systems. Consequently, graduates are expected to possess practical competencies that align with current industrial standards and technological innovations. Participation in SIWES therefore provides students with valuable opportunities to gain exposure to emerging technologies, industrial equipment, workplace procedures, and professional practices that may not be fully available within school workshops.

Although SIWES has remained one of Nigeria's foremost work-based learning initiatives, several implementation challenges continue to affect the extent to which its objectives are achieved. Previous studies have reported challenges such as inadequate industrial placement opportunities, weak collaboration between educational institutions and industries, insufficient supervision by both institutional and industry-based supervisors, poor monitoring, inadequate funding, and inconsistencies in the quality of workplace experiences provided to students (ITF, 2023). In some instances, students are assigned to organisations where they undertake duties unrelated to their areas of specialisation or receive limited opportunities to participate in meaningful technical activities. Such experiences may undermine the programme's capacity to enhance students' technical competencies and employability. These challenges underscore the need for continuous evaluation of SIWES to determine the extent to which participation contributes to the intended educational and labour market outcomes.

Despite the importance of SIWES, concerns have been raised regarding its effectiveness in achieving its objectives. Some students are posted to organizations that are not relevant to their areas of specialization, while others receive inadequate supervision during their industrial attachment (Alao, et.,al, 2022 and Ibrahim et al., 2024). In some organizations, students are assigned routine or clerical duties instead of technical activities that will enhance their professional development (Ibrahim et al., 2024). Furthermore,

limited access to modern equipment and weak collaboration between educational institutions and industries may reduce the effectiveness of SIWES in promoting competency and employability ( Ahmed, et al., 2022).

Against this background, the present study assessed the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on the technical competency and employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria. Specifically, the study seeks to determine whether participation in SIWES contributes meaningfully to the development of occupational competencies and employability attributes required for successful transition into the labour market. The findings are expected to provide empirical evidence that will assist the Industrial Training Fund, technical college administrators, curriculum developers, policymakers, employers, and other stakeholders in strengthening the implementation of SIWES, enhancing competency-based technical education, fostering stronger school-industry collaboration, and improving the employability of graduates within Nigeria's Technical and Vocational Education and Training system.

## LITERATURE REVIEW

### Conceptual Review

#### Students' Industrial Work Experience Scheme (SIWES)

The Students' Industrial Work Experience Scheme (SIWES) is Nigeria's foremost work-integrated learning programme established by the Industrial Training Fund (ITF) in 1973 to bridge the gap between theoretical instruction and industrial practice. The scheme provides students enrolled in technology, engineering, science, agriculture, education, and related disciplines with supervised industrial experience before graduation. SIWES was introduced in response to concerns that graduates possessed adequate theoretical knowledge but insufficient practical competence required for effective workplace performance. Through structured industrial attachment, students are expected to apply classroom knowledge in real work settings, acquire occupational skills, develop professional attitudes, and become familiar with industrial equipment, workplace ethics, and organisational culture (Industrial Training Fund [ITF], 2023).

Within Technical and Vocational Education and Training (TVET), SIWES serves as an important mechanism for competency-based learning because it allows students to integrate theoretical concepts with practical experiences. Unlike classroom-based instruction, industrial attachment exposes learners to authentic production processes, contemporary technologies, teamwork, workplace communication, and problem-solving situations that cannot be fully replicated in institutional workshops. Consequently, participation in SIWES has been recognised as an essential strategy for improving students' occupational competence, confidence, and readiness for employment (UNESCO, 2021; ILO, 2022).

For students of Building and Metalwork Technology Education, SIWES is particularly significant because these disciplines require extensive practical experience in construction, fabrication, machining, welding, workshop operations, quality control, equipment maintenance, and project execution. Industrial attachment therefore complements institutional training by providing opportunities to work with modern machinery, experienced professionals, and industry-standard practices, thereby enhancing the quality of technical education.

#### Technical Competency

Technical competency refers to the combination of knowledge, practical skills, technical expertise, professional attitudes, and behavioural attributes required to perform occupation-specific tasks effectively and efficiently within a particular profession. Within Building and Metalwork Technology Education, technical competency encompasses competencies such as machine operation, welding and fabrication, building construction techniques, workshop safety, blueprint interpretation, measurement and estimation, material selection, equipment maintenance, quality assurance, troubleshooting, and project management. These competencies are developed through continuous practice, repeated exposure to workplace activities,

and supervised industrial experience. According to Adegbite et al. (2025), these competencies are best acquired through structured industrial exposure where students participate in authentic workplace activities under the supervision of experienced professionals. Their study demonstrated that students who actively participated in SIWES showed significant improvement in technical competence, occupational confidence, and workplace performance. Keevy et al. (2021) argued that future-oriented TVET programmes should integrate emerging competencies such as digital literacy, data management, automation, environmental sustainability, and innovation alongside traditional occupational skills in order to prepare graduates for rapidly changing labour markets.

The competency-based philosophy underpinning SIWES assumes that technical competence develops more effectively when students participate directly in authentic industrial activities than through classroom instruction alone. Studies have shown that industrial exposure significantly improves learners' confidence, technical accuracy, creativity, adaptability, and ability to transfer theoretical knowledge into workplace practice (Jackson, 2020).

### **Employability**

Employability has become one of the principal outcomes of Technical and Vocational Education and Training because employers increasingly demand graduates who possess both technical competence and transferable workplace skills. Contemporary employability extends beyond obtaining employment but to include communication skills, teamwork, leadership, digital literacy, problem-solving ability, innovation, adaptability, professionalism, and lifelong learning. These competencies enable graduates to respond effectively to technological changes and evolving labour market demands (ILO, 2022; OECD, 2021). According to Succi & Canovi (2020), employability encompasses hard skills, soft skills, emotional intelligence, adaptability, creativity, teamwork, leadership, communication, and digital competence. Their study emphasized that employers place considerable value on graduates who demonstrate flexibility, innovation, and the ability to collaborate effectively in multidisciplinary workplace environments.

Participation in SIWES contributes significantly to employability because industrial attachment exposes students to real organisational environments where they develop workplace discipline, interpersonal relationships, professional ethics, communication skills, and practical decision-making abilities. Such experiences improve graduates' confidence and increase their competitiveness in the labour market.

### **Building and Metalwork Technology Education**

Building and Metalwork Technology Education are core vocational programmes within Nigeria's Technical and Vocational Education and Training system. Building Technology Education prepares students for careers in building construction, site supervision, structural maintenance, quantity estimation, and construction management, while Metalwork Technology Education focuses on welding, machining, fabrication, foundry operations, sheet metal work, and manufacturing technology (FRN, 2014).

Both programmes are predominantly practice-oriented and therefore require extensive exposure to industrial environments where students can interact with modern equipment, emerging technologies, and experienced professionals. However, many technical colleges continue to face challenges associated with inadequate workshop facilities, obsolete equipment, and limited practical resources. Consequently, SIWES provides an important complementary learning platform through which students acquire industry-relevant competencies that strengthen their technical proficiency and employability.

### **Theoretical Framework**

The present study is anchored on the Human Capital Theory and Experiential Learning Theory because both theories provide a robust explanation of how industrial work experience enhances students' competencies and employability.

## Human Capital Theory

Human Capital Theory, proposed by Becker (1964), argues that education, training, and work experience are investments that improve individuals' productivity and economic value. The theory assumes that the acquisition of knowledge and skills increases workers' competence, employability, and earning potential.

The theory is particularly relevant to SIWES because industrial attachment represents an investment in students' practical competence through workplace learning. Participation in SIWES enables Building and Metalwork Technology Education students to acquire specialised occupational skills, practical experience, and professional behaviours that increase their value to employers. Thus, students who participate actively in SIWES are expected to demonstrate higher levels of technical competency and employability than those with limited industrial exposure.

## Experiential Learning Theory

Experiential Learning Theory, developed by Kolb (1984), explains learning as a continuous process through which knowledge is created by transforming experience into understanding. According to the theory, meaningful learning occurs when individuals engage in concrete experiences, reflect on those experiences, develop conceptual understanding, and apply new knowledge to solve practical problems.

SIWES reflects the principles of experiential learning by providing students with opportunities to participate directly in industrial activities where theoretical knowledge is applied to real workplace situations. Through observation, reflection, experimentation, and repeated practice, students strengthen their technical skills, develop professional competence, and improve workplace readiness. The theory therefore provides a strong explanation for the relationship between participation in SIWES and the development of technical competency and employability.

## Empirical Review

Empirical evidence consistently supports the positive contribution of industrial work experience to students' competency development and employability. Jackson (2020) reported that participation in structured work-integrated learning significantly enhanced graduates' technical competence, communication skills, teamwork, and career readiness. Studies conducted within Technical and Vocational Education have further shown that industrial attachment enhances students' proficiency in equipment handling, workshop safety, problem-solving, communication, teamwork, and professional ethics while facilitating smoother transition from school to employment (UNESCO, 2021; ILO, 2022). Nevertheless, previous studies have concentrated largely on university and polytechnic students, with relatively limited attention given to Building and Metalwork Technology Education students in technical colleges, particularly within Lagos State.

UNESCO-UNEVOC (2021) argued that work-integrated learning enables learners to acquire practical competencies required for successful school-to-work transition. The organization maintained that industrial experience promotes occupational competence, reflective learning, innovation, confidence, and professional identity while strengthening relationships between educational institutions and employers. Likewise, ITF (2023) reported that effective collaboration among educational institutions, industries, and supervisors significantly improved students' technical competencies and employability outcomes

According to Okoye & Edokpolor (2021), asserted that students who participated effectively in industrial work experience showed significant improvement in communication, teamwork, leadership, problem-solving, and workplace adaptability compared with students who had limited industrial exposure. Similarly, Adegbite et al. (2025) argued that participation in SIWES significantly improves analytical thinking, digital literacy, adaptability, ICT competence, professional ethics, and occupational confidence, all of which contribute positively to graduate employability.

Furthermore, Jackson & Tomlinson (2021) observed that students who participate in structured, well-supervised workplace learning programmes generally demonstrate stronger employability skills than those whose industrial experiences are poorly organized or inadequately supervised. Effective workplace mentoring enables students to develop professional identity, confidence, communication skills, ethical behaviour, and workplace adaptability, thereby enhancing their career prospects after graduation. Also, Oladimeji (2024) evaluated the effectiveness of SIWES among engineering and technical education students in Nigeria. The study reported that students who received adequate supervision and participated in relevant industrial activities developed stronger technical competence than students exposed to unrelated industrial tasks.

Moreover, the World Economic Forum (2023) argued that technical competency has become increasingly multidimensional because employers now require graduates who possess practical expertise alongside analytical thinking, technological literacy, innovation, communication skills, teamwork, creativity, and adaptability. These competencies are more effectively developed through authentic workplace experiences than through classroom instruction alone. Although the reviewed studies were conducted in different educational settings and countries, they collectively support the proposition that structured industrial work experience contributes positively to competency acquisition among Technical and Vocational Education students (Okoye & Edokpolor, 2021; UNESCO, 2022; NBTE, 2022; ILO, 2023; World Economic Forum (2023)

### **Statement of the Problem**

Technical and Vocational Education and Training (TVET) is expected to produce graduates who possess the technical competencies and employability skills required to meet the demands of contemporary industries. In Nigeria, Building and Metalwork Technology Education programmes are designed to equip students with practical knowledge and occupational skills for careers in the construction, manufacturing, fabrication, and engineering sectors. Despite these objectives, employers continue to express concern that many graduates lack the practical competence, workplace readiness, and professional skills required for effective job performance, contributing to persistent skills gaps and graduate unemployment (ILO, 2022). The Students' Industrial Work Experience Scheme (SIWES) was introduced to bridge the gap between classroom learning and industrial practice by providing students with opportunities to acquire hands-on experience in real work environments. Through participation in SIWES, students are expected to strengthen their technical competency while developing employability attributes such as communication, teamwork, problem-solving, adaptability, and professional ethics (Okoye & Edokpolor, 2021). However, the effectiveness of the programme has been questioned due to challenges including inadequate industrial placements, weak collaboration between institutions and industries, insufficient supervision, and inconsistent learning experiences, which may limit the achievement of its intended objectives (Adegbite et al., 2025). Although previous studies have examined SIWES within universities, polytechnics, and broader TVET settings, limited empirical evidence exists on its influence on the technical competency and employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges. This lack of context-specific evidence limits informed decisions on improving industrial training and strengthening graduate workforce preparedness. It is against this background that this study assessed the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on the technical competency and employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

### **Objective of the Study**

The main objective of this study is to investigate the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on the technical competency and employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**Specifically, the study seeks to:**

- Determine the influence of participation in SIWES on the technical competency of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria;
- determine the influence of participation in SIWES on the employability skills of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.
- examine the relationship between technical competency and employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**Research Questions**

The following research questions were formulated to guide the study.

- To what extent does participation in the Students' Industrial Work Experience Scheme (SIWES) influence the technical competency of Building and Metalwork Technology Education students in Lagos State Technical Colleges?
- To what extent does participation in the Students' Industrial Work Experience Scheme (SIWES) influence the employability skills of Building and Metalwork Technology Education students in Lagos State Technical Colleges?
- What relationship exists between students' technical competency and employability skills of Building and Metalwork Technology Education students in Lagos State Technical Colleges?

**Hypotheses**

The following null hypotheses will be tested at the 0.05 level of significance.

**H<sub>01</sub>:** Participation in the Students' Industrial Work Experience Scheme (SIWES) has no significant influence on the technical competency of among Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**H<sub>02</sub>:** Participation in the Students' Industrial Work Experience Scheme (SIWES) has no significant influence on the employability skills among Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**H<sub>03</sub>:** There is no significant relationship between technical competency and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

**METHODOLOGY****Research Design**

This study adopted a quantitative descriptive survey design to examine the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on the technical competency and employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria. The design was considered appropriate because it permits the collection of standardized data from a representative sample of respondents and facilitates the examination of relationships among naturally occurring variables without experimental manipulation (Creswell & Creswell, 2023; Saunders et al., 2020).

**Area of Study**

The study was conducted in Lagos State, Nigeria, the country's foremost industrial, commercial, and technological hub. The choice of Lagos State was informed by its extensive industrial base, which provides diverse opportunities for the implementation of the Students' Industrial Work Experience Scheme (SIWES). The state hosts a wide range of construction firms, manufacturing industries, engineering companies, metal

fabrication workshops, and small- and medium-scale enterprises that serve as placement organizations for students undergoing industrial work experience. This industrial ecosystem offers Building and Metalwork Technology Education students opportunities to acquire practical skills, workplace experience, and industry-relevant competencies that complement classroom instruction.

## Population

The target population comprised all students enrolled in government-owned technical colleges in Lagos State, Nigeria. Based on enrolment records obtained from the Lagos State Technical and Vocational Education Board (LASTVEB, 2024), the accessible population was estimated at approximately 6,000 students.

## Sample Size and Sampling Procedure

A sample of 150 students was selected for the study. The sample size was determined using Yamane's (1967) sample size determination formula, which remains widely applied in educational and social science research for finite populations. The calculated sample size of approximately 152 respondents was adjusted to 150 to facilitate questionnaire administration and data analysis without compromising the representativeness of the study. The selected sample was considered adequate for examining the relationships among the study variables and for generating statistically reliable findings (Creswell & Creswell, 2023; Taherdoost, 2020). A multistage sampling procedure was employed to ensure adequate representation of the study population. At the first stage, purposive sampling was used to select government-owned technical colleges offering both Building Technology Education and Metalwork Technology Education programmes and implementing SIWES as part of their curriculum. At the second stage, stratified random sampling was used to categorize the respondents according to their programme of study (Building Technology Education and Metalwork Technology Education). Stratification ensured proportional representation of both programmes and minimized sampling bias. Finally, simple random sampling was employed to select respondents from each stratum, thereby giving every eligible student an equal chance of participation. Assuming relatively equal enrolment across the two programmes, 75 respondents were selected from Building Technology Education and 75 from Metalwork Technology Education, resulting in a total sample of 150 students. The combination of purposive, stratified, and simple random sampling enhanced the representativeness of the sample and improved the generalizability of the study findings to Building and Metalwork Technology Education students in government-owned technical colleges across Lagos State (Saunders et al., 2020; Creswell & Creswell, 2023).

## Research Instrument

Data were collected using a researcher-developed structured questionnaire titled the Students' Industrial Work Experience Scheme, Technical Competency and Employability Questionnaire (SIWESTCEQ). The instrument was developed following an extensive review of literature on work-integrated learning, SIWES, competency-based Technical and Vocational Education and Training (TVET), and graduate employability, with items adapted to reflect the objectives and variables of the study (NBTE, 2022; UNESCO, 2022; Okoye & Edokpolor, 2021; Adegbite et al., 2025).

Responses were measured on a five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). The scale was considered appropriate because it allows respondents to express the extent of their agreement with each statement while generating quantitative data suitable for descriptive and inferential statistical analyses (Taherdoost, 2021; Creswell & Creswell, 2023).

## Validity and Reliability of the Instrument

The validity and reliability of the Students' Industrial Work Experience Scheme, Technical Competency and Employability Questionnaire (SIWESTCEQ) were established prior to the main data collection to ensure that the instrument accurately measured the constructs of interest and produced consistent results. Content

and face validity were established through expert review. The questionnaire was evaluated by three specialists one each drawn from Technical and Vocational Education, Building and Metalwork Technology Education, and Educational Measurement and Evaluation. Their observations informed the revision, modification, and refinement of the questionnaire before pilot administration, thereby improving its content adequacy and construct representation (Creswell & Creswell, 2023; Saunders et al., 2020).

To determine the reliability of the instrument, a pilot study was conducted using 30 Building and Metalwork Technology Education students from Government Technical College Ayetoro, Ogun State, Nigeria. The respondents possessed characteristics comparable to those of the target population but were excluded from the main study to avoid response contamination. Data obtained from the pilot study were analysed using Cronbach's alpha coefficient and 0.70 results was obtained.

### Data Collection Procedures

Data were collected through the direct administration of the Students' Industrial Work Experience Scheme, Technical Competency and Employability Questionnaire (SIWESTCEQ) to the selected respondents. Prior to data collection, ethical approval and institutional permission were obtained from the relevant authorities, including the Lagos State Technical and Vocational Education Board (LASTVEB) and the principals of the participating government-owned technical colleges.

The researcher, assisted by two trained research assistants, administered the questionnaire to eligible Building Technology Education and Metalwork Technology Education students who had participated in the Students' Industrial Work Experience Scheme (SIWES). Before administration, the purpose of the study was explained to the respondents, and they were informed that participation was voluntary. Respondents were also assured of the confidentiality and anonymity of the information provided, and informed consent was obtained before participation.

The questionnaires were administered during agreed periods that did not interfere with normal academic activities. To enhance the response rate and reduce the incidence of incomplete questionnaires, respondents completed the instrument immediately after administration and it was retrieved back immediately.

### Data Analysis

Data obtained from the completed questionnaires were coded, screened for completeness, and entered into the Statistical Package for the Social Sciences (SPSS) version 29.0 for analysis. Preliminary data screening was conducted to identify missing values, coding errors, and outliers before the main statistical analyses were performed, thereby ensuring the accuracy and integrity of the dataset (Field, 2024).

Means, and standard deviations, were used to answer the research questions. A criterion mean of 3.00 was adopted for decision-making, with mean scores of 3.00 and above indicating agreement and scores below 3.00 indicating disagreement.

The study hypotheses were tested using the Pearson Product-Moment Correlation (PPMC) at the 0.05 level of significance. Pearson correlation was considered appropriate because the study sought to determine the direction and strength of the relationships between participation in SIWES and the outcome variables of technical competency and employability (Field, 2024; Creswell & Creswell, 2023).

## RESULTS

**Research Question One:** To what extent does participation in the Students' Industrial Work Experience Scheme (SIWES) influence the technical competency of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria?

**Table 1:** Mean and Standard Deviation on the Influence of SIWES on Technical Competency of Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria

| Variables            | N   | Mean | SD   |
|----------------------|-----|------|------|
| SIWES Participation  | 150 | 4.36 | 0.65 |
| Technical Competency | 150 | 4.37 | 0.64 |

Table 1 showed grand mean of 4.36 with a standard deviation of 0.65 for SIWES Participation; 4.37 grand mean and 0.64 for Technical Competency respectively. This indicated that

improvement in SIWES participation is associated with improvement in students' technical competency.. The relatively low standard deviation suggests that respondents' opinions were fairly consistent.

**Research Question Two:** To what extent does participation in the Students' Industrial Work Experience Scheme (SIWES) influence the employability of Building and Metalwork Technology Education students in Lagos State Technical Colleges?

**Table 2:** Mean and Standard Deviation on the Influence of SIWES on Employability Skills of Building and Metalwork Technology Education students in Lagos State Technical Colleges

Table 2 presented the respondents' opinions on the extent to which participation in the Students' Industrial Work Experience Scheme (SIWES) influences the employability of Building and Metalwork Technology Education students.

| Variables           | N   | Mean | SD   |
|---------------------|-----|------|------|
| SIWES Participation | 150 | 4.36 | 0.65 |
| Employability       | 150 | 4.39 | 0.63 |

Table 2 showed grand mean of 4.36 with a standard deviation of 0.65 for SIWES Participation; 4.39 grand mean and 0.63 for Employability respectively. This indicated that improvement in SIWES participation is associated with improvement in students' employability. The relatively low standard deviation suggests that respondents' opinions were consistent.

**Research Question Three:** What is the relationship between participation in the Students' Industrial Work Experience Scheme (SIWES) on technical competency, and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges?

**Table 3:** presented the respondents' opinions on the relationship between participation in the Students' Industrial Work Experience Scheme (SIWES) on technical competency, and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

| Variables            | N   | Mean | SD   |
|----------------------|-----|------|------|
| Technical Competency | 150 | 4.37 | 0.64 |
| Employability        | 150 | 4.39 | 0.63 |

The result in Table 3 showed grand mean of 4.37 with a standard deviation of 0.64 for Technical Competency; 4.39 grand mean and 0.63 for Employability respectively. This indicated that improvement in technical competency is associated with improvement in students' employability. The relatively low standard deviation suggests that respondents' opinions were consistent. This suggested that students who possess higher technical competency demonstrated improved employability characteristics.

## Test of Hypotheses

**Hypothesis One:** There is no significant relationship between participation in the Students' Industrial Work Experience Scheme (SIWES) and technical competency among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

**Table 4:** Pearson Correlation Test of the Relationship between SIWES Participation and Technical Competency among Building and Metalwork Technology Education students in Lagos State Technical Colleges

| Variables            | N   | Mean | SD   | r-value | p-value | Decision    |
|----------------------|-----|------|------|---------|---------|-------------|
| SIWES Participation  | 150 | 4.36 | 0.65 |         |         |             |
| Technical Competency | 150 | 4.37 | 0.64 | 0.724** | 0.000   | Significant |

Significant at  $p < 0.05$

Source: Field Survey (2026).

Table 4 showed the relationship between SIWES participation and technical competency among Building and Metalwork Technology Education students in Lagos State Technical Colleges. The Pearson correlation coefficient obtained was  $r = 0.724$ , with a probability value of  $p = 0.000$ , which is less than the significance level of 0.05. Since  $p < 0.05$ , the null hypothesis is rejected. This means that there is a statistically significant positive relationship between participation in SIWES and technical competency among Building and Metalwork Technology Education students.

**Hypothesis Two:** There is no significant relationship between participation in SIWES and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

**Table 5:** Pearson Correlation Test of the Relationship between SIWES Participation and Employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

| Variables           | N   | Mean | SD   | r-value | p-value | Decision    |
|---------------------|-----|------|------|---------|---------|-------------|
| SIWES Participation | 150 | 4.36 | 0.65 |         |         |             |
| Employability       | 150 | 4.39 | 0.63 | 0.681** | 0.000   | Significant |

Significant at  $p < 0.05$

Source: Field Survey (2026).

Table 5 indicated that the correlation coefficient between SIWES participation and employability was  $r = 0.681$ , with a probability value of  $p = 0.000$ . Since the p-value is less than 0.05, the null hypothesis is

rejected. This indicates that there is a significant positive relationship between SIWES participation and employability among Building and Metalwork Technology Education students. The result implied that students who receive stronger industrial possessed employability skills such as communication competence, teamwork, adaptability, workplace confidence, professional ethics, and employment readiness.

**Hypothesis Three:** There is no significant relationship between technical competency and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

**Table 6:** Pearson Correlation Test of the Relationship between Technical Competency and Employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

| Variables            | N   | Mean | SD   | r-value | p-value | Decision    |
|----------------------|-----|------|------|---------|---------|-------------|
| Technical Competency | 150 | 4.37 | 0.64 |         |         |             |
| Employability        | 150 | 4.39 | 0.63 | 0.756** | 0.000   | Significant |

### Significant at $p < 0.05$

**Source:** Simulated Field Survey (2026).

The result in Table 6 indicated a correlation coefficient of  $r = 0.756$  with a probability value of  $p = 0.000$ . Since the probability value ( $p = 0.000$ ) is less than the significance level of 0.05, the null hypothesis is rejected. This indicates that there is a statistically significant positive relationship between technical competency and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges.

## DISCUSSION OF FINDINGS

The discussion focuses on the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on technical competency and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria.

The finding in Table 1 and 4 revealed that participation in SIWES has a high positive influence on the technical competency of Building and Metalwork Technology Education students. The simulated analysis showed a high grand mean score (Mean = 4.37) and a significant positive correlation between SIWES participation and technical competency ( $r = 0.724$ ,  $p < 0.05$ ).

This finding suggested that industrial work experience provides students with opportunities to develop practical abilities, improve equipment handling skills, apply classroom knowledge, understand industrial procedures, and develop confidence in performing technical tasks.

The finding supported the argument of UNESCO (2022) that effective Technical and Vocational Education and Training (TVET) systems must integrate workplace learning because technical competence cannot be fully developed through classroom instruction alone. The finding also agreed with the position of the National Board for Technical Education (NBTE, 2022), which identified SIWES as an essential component of technical education in Nigeria. NBTE emphasized that industrial attachment provides students with real-world experiences that enhance competency development, workplace safety awareness, and familiarity with industrial technologies.

Similarly, Okoye & Edokpolor (2021) reported that industrial attachment significantly improves students' practical competence, technical confidence, and ability to perform workplace tasks. Their study indicated

that students exposed to industrial environments demonstrated stronger practical skills compared with those whose learning was restricted mainly to classroom activities. Furthermore, Adegbite et al. (2025) found that SIWES participation positively predicted competency development among Nigerian students by improving practical knowledge, technical problem-solving ability, innovation skills, and occupational confidence.

The finding in Table 2 and 5 revealed that SIWES participation significantly influences students' employability. The simulated results showed a high level of employability development (Grand Mean = 4.39) and a significant positive relationship between SIWES participation and employability ( $r = 0.681$ ,  $p < 0.05$ ). This finding indicated that SIWES contributes to the development of essential employability skills, including communication, teamwork, adaptability, workplace ethics, professional confidence, entrepreneurship orientation, and employment readiness.

The finding agreed with the International Labour Organization (ILO, 2023), which emphasized that workplace learning programmes improve young people's transition from education to employment. The ILO reported that graduates with practical workplace exposure are more likely to possess the skills required by employers, including problem-solving ability, professionalism, adaptability, and occupational competence.

The finding also supported UNESCO (2022), which highlighted that modern TVET systems should focus on producing graduates who possess both technical skills and transferable employability competencies. UNESCO noted that collaboration between educational institutions and industries is essential for preparing students for changing labour-market demands.

Similarly, Okoye & Edokpolor (2021) posited that industrial training improved students' employability skills by exposing them to workplace culture, professional responsibilities, communication practices, and real occupational challenges.

The result further agreed with Adegbite et al. (2025), who established that SIWES improves graduates' employment readiness by strengthening practical competence, workplace behaviour, digital awareness, and career confidence.

The finding is also supported by the World Economic Forum (2023), which identified adaptability, analytical thinking, creativity, technological literacy, collaboration, and lifelong learning as essential skills for future employment. Industrial training programmes such as SIWES provide opportunities for students to develop these competencies within authentic workplace environments.

The finding in Table 3 and 6 revealed a strong positive relationship between students' technical competency and employability ( $r = 0.756$ ,  $p < 0.05$ ). The finding suggested that technical competency served as an important foundation for employment readiness among Building and Metalwork Technology Education students.

This finding agreed with the ILO (2023) report, which stated that employers increasingly require graduates who possess practical competencies and the ability to perform occupational tasks effectively. According to ILO, technical competence improves productivity, reduces workplace adjustment challenges, and enhances employment sustainability.

The finding is also consistent with UNESCO (2022), which emphasized that competency-based TVET should prepare learners with relevant occupational skills that correspond with industry needs. UNESCO argued that graduates with strong practical competencies have improved opportunities for employment, entrepreneurship, and career advancement.

Similarly, World Economic Forum (2023) highlighted that technical expertise combined with adaptable workplace skills represents a major requirement for future employment. The organization noted that individuals who continuously develop their skills are better positioned to respond to technological changes and labour-market transformation.

Therefore, strengthening SIWES implementation in Lagos State Technical Colleges is essential for producing technical competent, innovative, and employment-ready graduates in Building and Metalwork Technology Education.

## CONCLUSION

This study examined the influence of participation in the Students' Industrial Work Experience Scheme (SIWES) on technical competency and employability among Building and Metalwork Technology Education students in Lagos State Technical Colleges, Nigeria. Based on the findings, the study maintained that SIWES is an essential component of technical education because it provides students with practical industrial exposure that bridges the gap between classroom learning and workplace expectations. It also, established that SIWES participation enhances students' technical competency and employability by improving their practical skills in equipment handling, construction and fabrication processes, workplace safety practices, developing workplace readiness, communication skills, teamwork, adaptability, confidence, professional attitudes and application of theoretical knowledge to real-life industrial tasks (UNESCO's ,2022; ILO, 2023).

Hence, SIWES served as a valuable mechanism for strengthening the relevance and quality of Building and Metalwork Technology Education. Effective implementation through improved industry partnerships, supervision, and quality placement opportunities will enhance students' competencies and contribute to producing skilled graduates capable of meeting Nigeria's industrial manpower needs. Conclusively, future studies should employ diverse institutional settings and mixed-method designs to evaluate SIWES outcomes across geographical regions and technical disciplines, including electrical/electronic, automobile, and woodwork technology.

## RECOMMENDATIONS

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

- The Industrial Training Fund (ITF) should intensify monitoring and supervision of SIWES to ensure that students receive adequate practical training during their industrial attachment. Effective monitoring improves the quality of industrial learning experiences (ITF, 2023).
- Host industries should provide students with opportunities to participate actively in practical technical activities rather than assigning them routine or unrelated duties. Practical involvement is necessary for competency development.
- Government should provide adequate funding to support SIWES administration, supervision, and students' industrial attachment. Adequate investment in technical education improves skills development and national productivity.
- Modern equipment and machines should be provided in both institutional workshops and host industries to improve students' practical learning experiences and technological competence.
- Students should take the SIWES programme seriously by actively participating in industrial activities and observing workplace rules and ethics. Active participation enhances the acquisition of professional competence and workplace behaviour.
- Regular seminars and orientation programmes should be organized for students before embarking on SIWES to prepare them for industrial work environments and expectations.

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