ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

Influence of Interactive Learning on the Construction of Electronic Fire Alarm System for Workshop Practice in Technical Colleges in Rivers State

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Publication Date: 2026/04/22

Abstract: The study determined the influence of interactive learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. The aim was to determine how interactive learning strategies affect students' understanding, skill acquisition, and practical competence in constructing electronic fire alarm system. The study adopted a descriptive survey research design. 2 objectives and 2 research questions guided the study, while 2 null hypotheses were formulated and tested at 0.05 level of significance. The population for the study was 100, which consisted of 10 Electronic Technology Workshop Instructors and 90 Students from Technical Colleges in Rivers State. A Census sampling technique was used as the population was manageable. A 24 question items structured questionnaire was developed and used as the main instrument for data collection. The instrument was validated by 3 experts in technical education. Cronbach's Alpha reliability method was used to determine the internal consistency of the instrument which stood at 0.82 reliability coefficient. The research questions were answered using mean and standard deviation, whereas the null hypotheses were tested using Z-test statistic. The results of the study revealed that interactive learning has a significant positive influence on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. It was recommended that Technical College teachers should adopt interactive learning strategies such as collaborative learning and experiential learning in the teaching of electronics and workshop practice. This will enhance students' understanding, participation, and practical competence in constructing electronic devices like fire alarm systems.

Keywords: *Technical Colleges, Electronic Workshops, Interactive Learning, Electronic Fire Alarm System.*

How to Cite: Rivelinho Manuel Mohamade; Agnes Clotilde Novela (2026) Influence of Interactive Learning on the Construction of Electronic Fire Alarm System for Workshop Practice in Technical Colleges in Rivers State. *International Journal of Innovative Science and Research Technology*, 11(3), 4001-4008. https://doi.org/10.38124/ijisrt/26mar268

I. INTRODUCTION

Technical Colleges are specialized institutions that provide vocational and technical education at the secondary school level. They aim to equip students with practical skills and knowledge in various trades, preparing them for employment or entrepreneurship. The National Policy on Education (2013) outlined the purpose of vocational and technical education as providing trained manpower in applied sciences, technology, and business, particularly at craft, advanced craft, and technical levels; providing the technical knowledge and vocational skills necessary for agricultural, commercial, and economic development; and providing training and imparting the necessary skills to individuals who shall be economically self-sufficient. Technical Colleges in Nigeria offer programmes in areas such as mechanical trades, electrical and electronic technology trades, building trades, wood trades, hospitality, textile trade, printing trades, beauty culture, and business trades (Ahmad, et.al, 2021). Graduates receive certifications like the National Technical Certificate (NTC) and the National Business Certificate (NBC) from the National Business and Technical Examinations Board

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

(NABTEB). Further, Ingbian et al. (2024) highlighted that Technical Colleges are crucial to Nigeria's educational landscape, shaping the nation's vocational education system by offering programmes in engineering, construction, agriculture, and information technology. They emphasized the importance of bridging the gap between academia and industry to enhance employability and foster innovation and entrepreneurship among graduates. Okoro (2018) noted that Technical Colleges are considered the most important vocational institutions in Nigeria, providing comprehensive vocational education aimed at preparing students for various jobs. However, he also pointed out that societal perceptions often view technical education as a less prestigious option compared to traditional university education, which affects enrollment rates. The National Board for Technical Education (NBTE) has called for the establishment of more Technical Colleges across Nigeria to address the deficit in the country's skilled labour force. Currently, Nigeria has only 110 Technical Colleges, whereas the Federal Republic of Nigeria (2013) recommends one in each of the 774 local government areas. Technical Colleges play a vital role in Nigeria's educational system by providing practical skills and knowledge to students. While they face challenges such as societal perceptions and infrastructure deficits, their contribution to workforce development and economic growth is significant. Addressing these challenges through increased funding, curriculum reform, and societal awareness can enhance the effectiveness of Technical Colleges in Nigeria. Most of the practical skills acquired by students are often learned in the Technical Colleges Workshop.

Workshops in Technical Colleges are indispensable to vocational and technical education. These facilities serve as practical learning environments where students transit from theoretical knowledge to real-world applications (Machief & Bwai, 2018). In the Nigerian educational context, workshops are critical to achieving the goals of technical education, particularly in preparing students for employment, entrepreneurship, and further technical training (Alabi, 2020). These workshops are designed and equipped to support hands-on training in specific trades and disciplines, contributing significantly to the development of a competent and skilled workforce. One of the most prominent types of workshops in Technical Colleges is the electronic workshop. Robinson (2018) defined electronic workshop in a technical college as a specialized facility that serves as a hands-on, practical learning environment where students gain and apply skills in the design, assembly, testing, troubleshooting, maintenance, and repair of electronic circuits, equipment, and systems. These spaces are crucial for training in electronic circuit design, maintenance of electrical appliances, and automation systems. The Institute for Industrial Technology (2024) and Instructional Design Central. (2023) opined that electronic workshop typically provide students with training in areas such as soldering, circuit fabrication, electrical diagnostics, and basic automation. Such workshops are instrumental in preparing students for careers in ICT, telecommunications, and electronic engineering. In recent years, the traditional teacher-centered methods used in teaching workshop-based subjects in Technical Colleges have been criticized for being ineffective in promoting creativity, problem-solving, and technological competence among students (Robinson, 2017). These methods often limit students' participation, reduce motivation, and fail to stimulate the development of critical thinking skills required in modern technological environments. Consequently, there has been a growing shift toward interactive learning approaches that emphasize student engagement, collaboration, and active participation in the learning process.

Interactive learning refers to an instructional approach that uses dialogue, collaboration, and hands-on activities to enhance understanding and retention. It involves the use of instructional strategies such as group discussions, collaborations, experiential, project-based learning, and technology-assisted instruction, where learners actively construct knowledge through interaction with content, instructors, and peers (Oluwatimilehin, et.al. 2021). In technical education, particularly in electronic and workshop practice, interactive learning provides opportunities for students to explore, experiment, and apply theoretical knowledge in practical contexts. Interactive learning is an approach that actively involves learners in the learning process, encouraging them to participate, ask questions, and engage with the material. It often incorporates technology, such as interactive simulations and virtual reality, to create immersive learning experiences. Research indicates that interactive learning methods can significantly improve student engagement and knowledge retention (Oreed, 2023). Interactive learning has increasingly become a cornerstone of technical and vocational education, particularly in the context of practical skill acquisition. In Nigerian Technical Colleges, this method emphasizes student engagement through hands-on activities, collaboration, and the integration of digital tools. In Rivers State, where the construction of electronic fire alarm systems forms a crucial aspect of electronic workshop training, the application of interactive learning strategies has the potential to significantly enhance both student understanding and technical competence. Okwelle and Iwezor (2023) highlighted the critical role of Information and Communication Technology (ICT) in improving the delivery of electrical installation and maintenance education. Their study, conducted in Technical Colleges in Rivers State, revealed that ICT-enhanced instruction not only boosts students' comprehension but also increases their motivation and participation. This supports the premise that interactive learning can facilitate deeper cognitive processing and better practical outcomes in technical workshops. Similarly, Ewe, et al. (2023) investigated the effect of peer tutoring strategies on students' interest in electronics work in Rivers State. Their findings showed that students taught using peer-led methods exhibited significantly higher levels of engagement and achievement than those taught through traditional lecture methods. Their research underscores the importance of active, student-centered learning strategies in technical education.

The construction of electronic fire alarm system is one of the essential projects in workshop practice that enables students to integrate their understanding of electronic components, circuit design, and safety principles. Fire alarm system serves as an early warning device that detects and

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

signals fire outbreaks, preventing loss of life and property. Engaging students in constructing such systems through interactive learning promotes experiential learning, teamwork, and innovation all of which are critical skills for 21st-century technical education. An electronic fire alarm system is a safety mechanism designed to detect and alert occupants of the presence of fire, smoke, or heat within a building. These systems generally consist of sensors such as smoke and heat detectors manual call points, sirens or buzzers, and a control panel that coordinates the response. According to Arif-Ali, et al. (2023), fire alarm systems play a crucial role in reducing the risk of injury, loss of life, and property damage by providing early detection and warning. Their work emphasized that fire alarm systems must be reliable, responsive, and designed according to the specific safety requirements of the environment in which they are installed. In Technical Colleges, particularly within electronic workshops, the construction of electronic fire alarm systems forms an essential part of practical training. This exercise provides students with opportunities to apply theoretical knowledge in a real-world context, involving the selection, configuration, and installation of system components. Al-Ameen (2013) noted that hands-on projects such as these help students understand the operational principles behind sensors, control systems, and alert mechanisms. His study also suggested that involving students in such projects improves their problem-solving capabilities and awareness of system integration.

The process of constructing a fire alarm system in an electronic workshop typically begins with circuit design and schematic planning. Students identify the required components such as resistors, transistors, relays, and power sources and develop a layout for the interconnections. Following the design phase, they move on to physically assembling the system on a breadboard or printed circuit board (PCB), ensuring each component is correctly positioned and wired. The project culminates in a rigorous testing phase, where the system is evaluated for responsiveness, reliability, and safety compliance. Robinson (2018) explained that electronic fire alarm systems can range from simple single-zone devices to complex multi-zone installations with advanced microcontroller-based interfaces. In Technical Colleges, students are usually introduced to basic systems, where they can grasp the principles of signal detection and transmission, circuit protection, and fail-safe mechanisms. The construction of fire alarm systems in technical college workshops not only reinforces students' understanding of electronics but also prepares them for employment in sectors such as safety technology, facility maintenance, and electrical installation. Through this process, learners gain valuable insights into circuit behaviour, fault diagnosis, and adherence to electrical safety standards. These skills are foundational to careers in electrical and electronic engineering, where precision, reliability, and safety are non-negotiable. The construction of this system requires special teaching and learning.

In the context of Technical Colleges in Rivers State, there is a growing concern that many students exhibit low practical competence and limited creativity in project execution, particularly in electronic trades. This situation may be attributed to the predominant use of passive teaching methods and inadequate exposure to interactive and student-centered learning strategies. Incorporating interactive learning techniques into workshop practice could therefore enhance students' understanding of electronic principles and improve their ability to construct functional devices such as fire alarm systems. Given the strategic importance of technical education to industrial and economic development, it becomes necessary to investigate how interactive learning influences the construction of electronic fire alarm systems among Technical College students in Rivers State. The findings of this study could provide insights into effective teaching approaches that promote skill acquisition, creativity, and technological innovation among students in technical education.

- *Statement of the Problem*

Technical education is designed to equip students with the knowledge and practical skills necessary for technological and industrial development. However, in many Technical Colleges in Nigeria, including those in Rivers State, the objectives of technical education are yet to be fully realized (Robinson, 2018). Evidence from classroom observations and examination results reveals that students often perform poorly in practical subjects such as Basic Electronics and Workshop Practices. Many students lack the competence and confidence required to design and construct functional electronic projects such as fire alarm systems.

One major reason for this shortfall has been linked to the continued reliance on traditional teacher-centered instructional methods**,** where teachers dominate lessons through lectures and demonstrations while students play passive roles (Robinson, 2017). Such methods often fail to stimulate learners' curiosity, creativity, and problem-solving abilities. Consequently, students find it difficult to translate theoretical knowledge into practical applications, especially in workshop-based activities that demand innovation and hands-on skills. In contrast, interactive learning approaches encourage active student participation, peer collaboration, and self-directed problem-solving elements that are essential in developing practical competence and technological creativity. Despite the recognized benefits of interactive learning, its adoption in Technical Colleges appears limited due to factors such as inadequate teacher training, poor workshop facilities, and lack of awareness of modern pedagogical strategies. This has led to a persistent gap between what students are taught and what they can actually do in practical terms.

Specifically, in the construction of electronic fire alarm systems, many students are unable to correctly identify components, design circuits, or assemble functional systems independently. This problem not only affects their academic performance but also undermines the overall goal of technical education, which is to produce skilled and self-reliant craftsmen and technicians capable of meeting the demands of the modern workplace. It is against this backdrop that this study seeks to examine the influence of interactive learning on the construction of electronic fire alarm systems for

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

workshop practice in Technical Colleges in Rivers State**.** The study aims to determine whether interactive learning strategies can enhance students' understanding, participation, and practical competence in electronic project construction.

➢ *Aim and Objectives of the Study*

The aim of the study was to determine the influence of interactive learning on the construction of electronic fire alarm systems in electronic workshops in Technical Colleges in Rivers State. Specifically, the study determined the:

- Influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State.
- Influence of experiential learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State.

➢ *Research Questions*

The following research questions guided the study:

- What is the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State?
- What is the influence of experiential learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State?

➢ *Hypotheses*

The following null hypotheses were formulated and tested at .05 level of significance:

- Hypothesis 1 (HO_1): There is no significant difference between the mean responses of instructors and students on the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State.
- Hypothesis 2 (HO_2): There is no significant difference between the mean responses of instructors and students on the influence of experiential learning on the construction of electronic fire alarm systems in electronic workshops in technical colleges in Rivers State.

II. METHODOLOGY

The research design adopted for this study was a descriptive survey research design. This design was considered appropriate because the study seeks to collect, analyze, and interpret data from a sample of respondents The area of the study was Technical Colleges in Rivers State. There are four Technical Colleges in Rivers State that offer Electronic Technology Trade. The four Technical Colleges are Government Technical College, Ahoada, Government Technical College, Eleogu, Government Technical College, Port Harcourt and Government Technical College, Tombia. The population for the study was made up of 100, which consisted of 10 Electronic Technology Workshop Instructors and 90 Electronic Technology Students from the four Technical Colleges which are owned and managed by Rivers State Government. All the members of the population were used for the study, since the population size was manageable. Hence, census sampling technique was employed for the sample size A structured questionnaire of 24 question items was the instrument used for eliciting data from the respondents. The questionnaire utilized a 4-point Likert-scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with the assigned scores of 4, 3, 2 and 1 respectively. The criteria mean was 2.5.

Three experts validated the instruments. Two from the Department of Industrial Technical Education, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State and one from the Department of Measurement and Evaluation, Enugu State University of Science and Technology (ESUT), Agbani. The inputs of the experts helped in modifying the instrument. The instrument was tried and tested at Government Technical College Sagbama Bayelsa State, using 5 Electronic Technology Workshop Instructors and 20 Students. An internal consistency test of reliability was carried out using Cronbach's Alpha method, and a reliability coefficient of 0.84 was obtained. The researcher distributed and collected the questionnaire on the spot and there was a 100% return rate of the questionnaire. The data collected for the study were analyzed using mean and standard deviation for the research questions and Z-test for the hypotheses at .05 level of significance. The responses to the items were interpreted as seen below. Strongly Agree (SA) =3.50 – 4.49, Agree (A) = 2.50 – 3.49, Disagree (D) =1.50 – 2.49 and Strongly Disagree (SD) = 0.50 – 1.49. The decision for hypotheses was that if the calculated value of Z (zcal) is less than the critical value of Z (zcrit), accept the null hypothesis but if the calculated value of Z (zcal) is greater than or equal to the critical value Z (zcrit) at 0.05 level significance, then reject the null hypothesis.

III. PRESENTATION OF RESULTS

➢ Research Question 1: What is the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State?

Table1: Mean and Standard Deviation Responses of Instructors and Students on the Influence of Collaborative Learning on the Construction of Electronic Fire Alarm System for Workshop Practice in Technical Colleges in Rivers State

S/N	Items	Instructors (N=10)			Students (N=90)		
		X	SD	DEC	X	SD	DEC
1	Collaborative learning improves students' ability to assemble electronic fire alarm systems efficiently.	3.20	1.20	A	3.23	.04	A

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2	Working in groups helps students understand the functions of different components in fire alarm circuits.	3.20	.97	A	3.04	.31	A
3	Peer-to-peer interaction during group tasks enhances problem-solving during circuit construction.	3.10	1.15	A	3.26	.39	A
4	Group work increases students' confidence in handling electronic tools and equipment.	2.87	1.07	A	3.20	.49	A
5	Collaborative learning encourages active participation and engagement during workshop activities.	3.40	1.01	A	3.22	.40	A
6	Students complete fire alarm system projects more accurately when working as a team.	3.00	.00	A	3.00	.00	A
7	Collaborative tasks help students learn from each other's strengths and technical skills.	3.40	.90	A	3.22	.40	A
8	Students are more motivated to complete practical assignments when working collaboratively.	2.92	1.02	A	3.22	.40	A
9	Group discussions promote deeper understanding of fire detection and alarm system design.	2.56	1.20	A	3.10	.40	A
10	Students demonstrate improved communication and teamwork skills through collaborative construction tasks.	3.00	1.04	A	3.02	.40	A
11	Collaborative learning simulates real-life engineering teamwork, preparing students for industry work.	3.00	1.06	A	3.46	.49	A
12	Students can identify and correct errors more quickly when constructing fire alarm systems as a group.	2.81	1.01	A	3.18	.37	A
	Cluster Mean / SD	**3.05**	**.97**	**A**	**3.18**	**.34**	**A**

Result in Table 1 revealed that all the 12 items are the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State as the responses to all the items were "Agree". The grand mean for instructors and students is respectively 3.05 and 3.18. Similarly, the grand standard deviation for instructors and students is also respectively 0.97 and 0.34. All these are indication that the items are the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. The low standard deviation indicates that the respondents were close in their responses.

- Research Question 2: What is the influence of experiential learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State?

Table 2: Mean and Standard Deviation Responses of Instructors and Students on the Influence of Experiential Learning on the Construction of Electronic Fire Alarm System for Workshop Practice in Technical Colleges in Rivers State

S/N	**Items**	**Instructors (N=10)**			**Students (N=90)**		
		X	**SD**	**DEC**	**X**	**SD**	**DEC**
1	Students demonstrate improved understanding of fire alarm system components through hands-on activities.	3.02	1.02	A	3.20	.04	A
2	Participation in practical tasks enhances students' ability to design functional fire alarm circuits.	3.30	1.01	A	3.30	.46	A
3	Experiential learning helps students apply theoretical knowledge in real-world electronic tasks.	3.20	1.10	A	3.10	.30	A
4	Hands-on construction of fire alarm systems improves students' troubleshooting and diagnostic skills.	2.50	1.18	A	3.30	.46	A

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

5	Direct engagement with tools and materials increases students' confidence in handling electronic devices.	3.02	.82	A	3.40	.49	A
6	Students learn better when they are allowed to construct and test circuits themselves rather than just observe.	3.02	1.40	A	3.10	.30	A
7	Experiential learning allows students to develop a deeper understanding of safety protocols in electronic system construction.	3.01	.76	A	3.20	.40	A
8	Frequent hands-on practice improves students' speed and accuracy in assembling electronic fire alarm systems.	3.40	1.05	A	3.10	.30	A
9	Learning by doing enhances students' retention of concepts related to fire detection and alarm circuits.	3.36	.75	A	3.10	.30	A
10	Engagement in real-life simulations helps students understand the importance of reliability in fire alarm systems.	3.14	1.05	A	3.33	.49	A
11	Students become more motivated and interested in electronics when involved in experiential learning projects.	3.11	.71	A	3.15	.07	A
12	Experiential learning promotes creativity and innovation in designing improved versions of fire alarm systems.	3.14	.74	A	2.90	.82	A
	Cluster Mean / SD	**3.10**	**1.12**	**A**	**3.18**	**.37**	**A**

Result in Table 2 revealed that all the 12 items are the influence of experiential learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State as responses to all the items were "Agree". The grand mean for instructors and students is respectively 3.10 and 3.18. Similarly, the grand standard deviation for instructors and students is also respectively 1.12 and 0.37. All these are indication that the items are the influence of experiential learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State The low standard deviation indicates that the respondents were close in their responses.

- Hypothesis 1 (HO_1): There is no significant difference between the mean responses of instructors and students on the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State.

Table 3: Z-Test Result of Mean Responses of Instructors and Students on the Influence of Collaborative Learning on the Construction of Electronic Fire Alarm System for Workshop Practice in Technical Colleges in Rivers State

Respondents	N	X	SD	Df	Z-cal	Z-tab	P	Decision
Instructors	10	3.05	.97	98	.98	2.00	.05	Not Sig
Students	90	3.18	.34					

The analysis in Table 3 shows that Z-value at .05 level of significance and 98 degree of freedom for 12 items had their Z-calculated value as .98 while the table Z-value is 2.00. Since the table Z-value is more than the Z-calculated, the null hypothesis is therefore not rejected for these items. This implies that there is no significant difference between the mean responses of instructors and students on the influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State.

- Hypothesis 2 (HO_2): There is no significant difference between the mean responses of instructors and students on the influence of experiential learning on the construction of electronic fire alarm systems in electronic workshops in technical colleges in Rivers State.

Table 4: Z-Test Result of Mean Responses of Instructors and Students on the Influence of Experiential Learning on the Construction of Electronic Fire Alarm System for Workshop Practice in Technical Colleges in Rivers State

Respondents	N	X	SD	Df	Z-cal	Z-tab	P	Decision
Instructors	10	3.10	1.12	98	.53	2.00	.05	Not Sig
Students	90	3.18	.37					

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

The analysis in Table 4 shows that t-value at .05 level of significance and 98 degree of freedom for 12 items had their t-calculated value as .53 while the table Z-value is 2.00. Since the table Z-value is more than the z-calculated, the null hypothesis is therefore not rejected for these items. This means that there is no significant difference between the mean responses of instructors and students on the influence of experiential learning on the construction of electronic fire alarm systems in electronic workshops in technical colleges in Rivers State.

IV. DISCUSSION OF FINDINGS

The study in research question 1 revealed that the respondents agreed on all the items that there is influence of collaborative learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. This implies that collaborative learning improves students' ability to assemble electronic components and construct electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. Similarly, the study in hypothesis 1 also revealed that there is no significant difference between the mean responses of instructors and students on the influence of collaborative learning on the construction of electronic fire alarm systems in electronic workshops in technical colleges in Rivers State. Therefore, the findings of the study revealed that interactive learning significantly improved students' understanding of electronic circuit design. Students exposed to interactive learning methods such as collaborative learning showed better conceptual understanding of how electronic components function and how to connect them in circuits. This aligns with the findings of Ewe et al. (2023) who reported that interactive instructional methods enhance comprehension and retention in technical subjects. Interactive learning provided opportunities for students to actively engage with the content, ask questions, and collaboratively solve problems, thereby deepening their grasp of circuit design principles compared to those taught through traditional lecture methods.

The study in research question 2 revealed that the respondents agreed on all the items that there is influence of experiential learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. This implies that experiential learning improves students' engagement in real-life simulation, participation in practical tasks among others on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. Similarly, the study in hypothesis 2 also revealed that there is no significant difference between the mean responses of instructors and students on the influence of experiential learning in the construction of electronic fire alarm systems in electronic workshops in technical colleges in Rivers State. Therefore, the findings of the study revealed that interactive learning had a positive and significant effect on students' ability to construct functional electronic fire alarm systems. Students who participated in hands-on, interactive workshops were able to correctly identify electronic components, design circuit layouts, and assemble working fire alarm systems. This finding supports Okwelle and Iwezor (2023) who emphasized that practical-oriented, interactive learning enhances students' psychomotor skills and creativity in technical subjects. Through interactive learning, students are given the opportunity to learn by doing, they become more confident, skilled, and innovative in executing practical projects, fulfilling one of the core mandates of technical education.

V. CONCLUSION

The study examined the influence of interactive learning on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. From the findings, it is evident that interactive learning has a significant positive influence on the construction of electronic fire alarm system for workshop practice in Technical Colleges in Rivers State. The study established that when students are actively involved in interactive learning, they gain deeper conceptual understanding of electronic principles and become more competent in constructing functional electronic devices such as fire alarm systems. Interactive learning promotes creativity, collaboration, and problem-solving skills that are vital for success in technical and vocational education.

Therefore, interactive learning represents a more effective instructional approach for teaching workshop-based subjects in Technical Colleges. Its adoption can significantly enhance students' practical competence, motivation, and technological innovation. Hence, Technical Colleges in Rivers State should integrate interactive learning strategies into their teaching of electronics and other technical subjects to achieve the goals of technical education and national development.

RECOMMENDATIONS

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

- Technical College teachers should adopt interactive learning strategies such as collaborative learning and experiential learning in the teaching of electronics and workshop practice. This will enhance students' understanding, participation, and practical competence in constructing electronic devices like fire alarm systems.
- The government, through the Ministry of Education and relevant agencies such as the National Board for Technical Education (NBTE), should organize regular workshops and seminars to train technical teachers on modern, interactive learning that encourage active students' participation and creativity.
- The government and school administrators should ensure that Technical Colleges are well equipped with functional workshop tools, electronic components, and instructional resources needed for effective interactive learning and project-based instruction.
- Adequate infrastructure such as well-ventilated workshops, stable electricity supply, and safety equipment should be provided to create an enabling environment for practical and interactive learning activities.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26mar268

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