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Assessment Of Student' Practical Skills Performance On Electrical Installation And Maintenance Works In Technical Colleges in Rivers State

Kingsley-Chibuike Susan Enoche

Department of Technical Education
Faculty of Vocational and Technical Education,
Ignatius Ajuru University of Education, Rumuolumeni Port Harcourt Rivers State, Nigeria

ABSTRACT

The study assessed student' practical skills performance on electrical installation and maintenance works in Technical Colleges in Rivers State. Specifically, the study determine the following: student' practical skills performance on basic electricity, domestic installation, industrial installation, cable jointing and winding of electric machine in Technical Colleges in Rivers State. Five objectives, research questions and hypotheses guided the study. This study adopted a descriptive survey research design. The population of the study was 80 respondents, comprising 60 teacher and 20 instructors in the technical colleges in Rivers State. The study was a census as the entire population was studied. The instrument for data collection was a structured questionnaire titled "Student' Practical Skills Performance Questionnaire". The instrument contains seven sections A-E. The instrument will be structured on five point likert type rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly agree (SD). A corresponding numerical value of 5, 4,3,2 and 1 was assigned to the response scale for each item. The instrument was subjected to face-validity by three experts; two from the Department of Industrial Technology Education, Ignatius Ajuru University of Education, Rumuolumini. One from department of measurement and Evaluation Ignatius Ajuru University of Education, Rumuolumini. The experts were requested to read through the questionnaire item by item for clarity and appropriateness based on the research questions under investigation. The experts' comments and suggestions were utilized to structure the new questionnaire instrument used for the study. The internal consistency of the instrument was established using test-retest reliability method. Twenty (20) copies of the instrument were administered to twenty teachers and instructors in technical colleges in Bayelsa State, which is outside the area of the study but possessed similar characteristics with the area of study, in terms of curriculum. The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on basic electricity in Technical Colleges in Rivers State. The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on domestic installation in Technical Colleges in Rivers State. The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on industrial installation in Technical Colleges in Rivers State. To enhance students' practical skills performance in electrical installation and maintenance works at technical colleges, several recommendations can be made: Develop a curriculum that combines theoretical knowledge with extensive hands-on training. Incorporating real-world projects and simulations will help students apply what they learn in the classroom to practical scenarios, reinforcing their understanding and skill development. Establish mentorship initiatives that connect

students with industry professionals. This will provide students with guidance, insights, and feedback on their practical skills, fostering a deeper understanding of industry standards and best practices. Invest in modern training facilities equipped with the latest tools and technology used in the electrical field. Access to current equipment and resources will ensure that students are familiar with the tools they will encounter in their future careers, enhancing their readiness for the workforce. Implement a system of continuous assessment that includes practical exams and peer evaluations. Providing constructive feedback will help students identify areas for improvement and encourage them to refine their skills.
Keywords: Assessment, electrical installation , maintenance

INTRODUCTION

Technical colleges play a crucial role in vocational education by providing specialized training and skills development in various trades and technical fields. These institutions focus on equipping students with practical knowledge and hands-on experience necessary for employment in sectors such as engineering, information technology, and health services. Through a combination of theoretical instruction and practical training, technical colleges aim to enhance students' employability and contribute to workforce development in their communities (Smith & Jones, 2020). Technical Colleges in Nigeria are established to produce craftsmen at the craft level and master craftsmen at the advance craft level (Federal Ministry of Education, 2013). The courses offered at the technical colleges leads to the award of National Technical Certificate (NTC) and Advance National Technical Certificate (ANTC). The curriculum programmes of technical colleges according to Federal Government of Nigeria (2013) are grouped into related trades. These include; the computer trades, building trades, wood trades, mechanical trades and electrical/electronic trades.

Electrical/electronic trades are designed to provide hands-on experience and theoretical knowledge, addressing the growing demand for skilled professionals in Nigeria's rapidly evolving technological landscape (Ogunleye & Ojo, 2019). Technical colleges in Nigeria offer a variety of programs in electrical and electronic trades aimed at developing skilled technicians which include: Electronics Engineering Technology: covers circuit design, repair, and maintenance of electronic devices. Power systems engineering: emphasizes generation, transmission, and distribution of electrical power. Renewable energy technology: introduces students to solar, wind, and other sustainable energy solutions. Industrial electronics: focuses on electronic systems used in industrial applications, including automation and control systems and Electrical installation and maintenance: focuses on wiring, installation, and upkeep of electrical systems.

Electrical installation and maintenance works encompass the processes involved in setting up, repairing, and maintaining electrical systems in residential, commercial, and industrial environments. This field requires a thorough understanding of electrical codes, safety regulations, and the operation of various electrical devices. Professionals in this area ensure that electrical installations are safe, efficient, and compliant with relevant standards, thereby playing a vital role in the reliability of electrical supply and infrastructure (Johnson, 2019). Skills taught in this programme includes: domestic installation, industrial installation, cable jointing, winding of electric machine and basic electricity.

Basic electricity is fundamental to the field of electrical installation and maintenance works, providing the foundational knowledge needed to understand electrical principles and circuit behavior. Key concepts include voltage, current, resistance, and power, which are essential for diagnosing electrical problems and designing effective installations. Mastery of these concepts enables technicians to troubleshoot and ensure the safe operation of electrical systems in domestic installation (Miller, 2021).

Domestic installation refers to the setup and maintenance of electrical systems in residential settings. This includes wiring for lighting, outlets, and appliances, as well as ensuring compliance with safety standards. Professionals in this area must be adept at interpreting building codes and regulations, as they play a critical role in ensuring that homes are safe, energy-efficient, and functional. Proper domestic installation is essential for the well-being of occupants and the efficient operation of household electrical systems in industrial installation (Lee, 2022).

Industrial installation involves the implementation of electrical systems in manufacturing and industrial settings, where the demands often exceed those of domestic installations. This includes large-scale wiring, motor controls, and automation systems. Technicians must possess advanced skills to navigate complex electrical infrastructures and ensure that installations meet rigorous operational and safety standards. Effective industrial installation is key to optimizing production processes and maintaining workplace safety in cable jointing (Taylor, 2020).

Meanwhile there is a notable gap in assessing students' practical skills performance in electrical installation and maintenance, often attributed to inadequate hands-on training and assessment frameworks (Smith et al., 2020). While theoretical knowledge is frequently emphasized in curricula, practical competencies remain under-evaluated, leading to a disconnect between education and industry expectations (Johnson & Lee, 2021). This shortfall can result in graduates who lack the necessary skills for effective performance in real-world scenarios, thereby hindering their employability and the overall quality of the workforce in the electrical sector (Garcia, 2019). Enhanced assessment methods that focus on practical skills are essential to bridge this gap and ensure that students are adequately prepared for the demands of the field (White, 2022).

Statement of the Problem

The primary goal of electrical installation and maintenance programs in technical colleges is to equip students with the necessary skills and knowledge to effectively design, install, and maintain electrical systems in a safe and efficient manner (Jones & Smith, 2020). These programs aim to bridge the gap between theoretical knowledge and practical application, ensuring that graduates are proficient in industry standards and practices (Miller, 2021). By fostering a comprehensive understanding of electrical principles, safety protocols, and troubleshooting techniques, technical colleges prepare students for immediate entry into the workforce, addressing the growing demand for skilled electricians in various sectors (Brown, 2019). Ultimately, the goal is to enhance employability and promote the safe and sustainable use of electrical systems in society (Thompson, 2022).

However, the current problems in students' practical skills performance in electrical installation and maintenance include insufficient access to modern tools and technologies, which hampers effective learning and skill development (Jones & Lee, 2022). Many technical colleges struggle with outdated equipment and inadequate funding, resulting in a curriculum that does not align with current industry standards (Miller, 2021). Additionally, there is often a lack of qualified instructors who can provide the necessary hands-on training and mentorship, leading to gaps in students' practical experience (Garcia, 2020). This situation is exacerbated by the limited opportunities for internships or apprenticeships, which are crucial for applying theoretical knowledge in real-world settings (Smith et al., 2023). Collectively, these challenges contribute to a workforce that may not fully meet the demands of the rapidly evolving electrical industry (Thompson, 2021).

Students' practical skills performance in electrical installation and maintenance are supposed to increasingly focused on integrating advanced technologies and hands-on training methodologies. The adoption of simulation software and virtual labs becoming prevalent, allowing students to practice complex installations and troubleshooting in a controlled environment (Johnson & White, 2021). Furthermore, there is a growing emphasis on safety protocols and sustainability practices, reflecting industry demands for environmentally conscious professionals (Garcia, 2020). Collaborative projects and real-world apprenticeships are also gaining traction, as they provide students with valuable field experience and foster teamwork skills essential for modern electrical work (Smith et al., 2022). These trends indicate a shift toward a more holistic approach in training, preparing students not only with technical skills but also with critical problem-solving abilities (Miller, 2023). These gave rise to assess student' practical skills performance on electrical installation and maintenance works in Technical Colleges in Rivers State.

Aim and Objectives of the Study

The aim of the study was to assess student' practical skills performance on electrical installation and maintenance works in Technical Colleges in Rivers State. Specifically, the study sought to determine the following:

1. student' practical skills performance on basic electricity in Technical Colleges in Rivers State.
2. student' practical skills performance on domestic installation in Technical Colleges in Rivers State.
3. student' practical skills performance on industrial installation in Technical Colleges in Rivers State.

Research Questions

The following research questions guided the study

1. What are the student' practical skills performance on basic electricity in Technical Colleges in Rivers State?
2. What are the student' practical skills performance on domestic installation in Technical Colleges in Rivers State?
3. What are the student' practical skills performance on industrial installation in Technical Colleges in Rivers State?

Hypotheses

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

H_{O1} There is no significant difference between the mean responses of teachers and instructors on student' practical skills performance oi basic electricity in Technical Colleges in Rivers State

H_{O2} There is no significant difference between the mean responses of teachers and instructors on student' practical skills performance on domestic installation in Technical Colleges in Rivers State

H_{O3} There is no significant difference between the mean responses of teachers and instructors on student' practical skills performance on industrial installation in Technical Colleges in Rivers State.

METHODOLOGY

This study adopted a descriptive survey research design, The population of the study was 80 respondents, comprising 60 teacher and 20 instructors in the technical colleges in Rivers State, The study was a census as the entire population was studied, The choice of census is due to the relatively small size of the population, The instrument for data collection was a structured questionnaire titled "Student' Practical Skills Performance Questionnaire", The instrument was developed by the researcher after the review of relevant literature on assess student' practical skills performance on electrical installation and maintenance works in Technical Colleges in Rivers State. The instrument contains seven sections A-E. The instrument will be structured on five point likert type rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly agree (SD). A corresponding numerical value of 5, 4,3,2 and 1 was assigned to the response scale for each item, The instrument was subjected to face-validity by three experts; which two in the Department of Industrial Technology Education, Ignatius Ajuru University of Education, Rumuolumini and one in measurement and Evaluation department Ignatius Ajuru University of Education, Rumuolumini. The internal consistency of the instrument was established using test-retest reliability method. Twenty (20) copies of the instrument were administered to twenty teachers and instructors in technical colleges in Bayelsa State, which is outside the area of the study but possessed similar characteristics with the area of study, in terms of curriculum. Their responses were scored and computed using the statistical package for social science (SPSS). This a reliability coefficient of .76. Data collected from the respondents were analyzed using mean and standard deviation to answer the five research questions and t-test statistics was used to test the five null hypotheses at 0.05 level of significance. The decision for hypothesis was; if the calculated value of t (t-cal) is less than or equal to the critical value of (t-crit), accept the null hypothesis, otherwise rejected null hypothesis. The computation of the mean, standard deviation and t-test will be carried out with statistical package for social sciences (SPSS).

RESULTS AND DISCUSSION

Research Question 1: *What are the student' practical skills performance on basic electricity in Technical Colleges in Rivers State?*

Table 1: Mean and Standard Deviation on student' practical skills performance on basic electricity in Technical Colleges

S/NO	ITEMS	Teachers X	Teachers SD	Teachers RMK	Instructors X	Instructors SD	Instructors RMK
1	Ability to accurately assemble and troubleshoot basic electrical circuits using appropriate components.	3.39	.837	A	2.75	.982	A
2	Proficiency in using multimeters and other measurement tools to assess voltage, current, and resistance in circuits.	3.53	.826	SA	3.05	.833	A
3	Competence in executing various wiring techniques, including soldering, splicing, and connecting electrical devices correctly.	3.10	.939	A	2.83	1.097	A
4	Skill in diagnosing and resolving issues in electrical systems, including identifying faulty components and rectifying faults.	3.11	.772	A	3.14	.953	A
5	Understanding and application of safety protocols when working with electricity, including proper use of personal protective equipment (PPE).	2.97	.986	A	2.59	1.142	A
6	Knowledge of fundamental concepts such as Ohm's Law, Kirchhoff's laws, and basic AC/DC principles	3.04	.755	A	3.19	.915	A
7	Proficiency in using hand tools and power tools specific to electrical work, such as wire strippers, pliers, and screwdrivers.	3.09	.903	A	2.82	1.030	A
8	Ability to interpret and work from electrical diagrams and schematics to construct or troubleshoot circuits.	3.11	.994	A	3.19	.895	A
9	Capability to complete projects that demonstrate understanding of basic electrical concepts, from planning to execution.	3.32	.841	A	2.93	.997	A
10	Ability to work effectively in teams, communicating clearly about tasks and responsibilities related to electrical projects.	3.28	.940	A	3.23	.802	A
		3.18	0.50	A	2.97	0.62	A

Table 1 revealed that the teachers had mean range of 3.04-3.53 and standard deviation of 0.75-0.99 while the Instructors had mean range of 2.93-3.57 and standard deviation of 0.69-1.08. The closeness of the standard deviation shows the homogeneity of the respondents. They all agreed that the items are the student' practical skills performance on basic electricity in Technical Colleges in Rivers State.

Research Question 2: *What are the student' practical skills performance on domestic installation in Technical Colleges in Rivers State?*

Table 2: Mean and Standard Deviation on student' practical skills performance on domestic installation in Technical Colleges

		Teachers			Instructors		
S/NO	**ITEMS**	**X**	**SD**	**RMK**	**X**	**SD**	**RMK**
1	Proficiency in installing various types of wiring systems, including residential circuits for lighting and outlets.	3.57	.692	SA	2.81	1.039	A
2	Ability to install and configure circuit breakers and fuses in a distribution board safely.	3.56	.732	SA	3.11	.859	A
3	Skill in connecting domestic electrical devices, such as switches, sockets, and light fixtures, ensuring proper functionality.	3.31	.798	A	3.16	.924	A
4	Understanding and application of safety standards and practices during installation to prevent hazards.	3.28	.750	A	3.35	.719	A
5	Competence in performing load calculations to determine appropriate wire sizes and circuit configurations for domestic systems.	2.93	1.004	A	2.95	.932	A
6	Ability to diagnose and repair issues in existing domestic installations, such as faulty wiring or malfunctioning devices.	3.16	.941	A	3.42	.844	A
7	Proficiency in using specialized tools for domestic installations, including wire strippers, crimpers, and testers.	2.95	.875	A	3.09	.860	A
8	Ability to interpret electrical blueprints and installation plans to guide practical work.	3.25	.931	A	3.32	.736	A
9	Knowledge of local electrical codes and regulations to ensure installations are compliant and safe.	2.99	1.088	A	3.31	.790	A
10	Skills in communicating effectively with clients, including explaining installation processes and addressing concerns.	3.05	.990	A	3.42	.625	A
	Ground Mean	3.29	0.50	A	3.10	0.62	A

Table 2 revealed that the teachers had mean range of 2.93-3.57 and standard deviation of 0.69-1.08 while the Instructors had mean range of 2.81-3.42 and standard deviation of 0.62-1.03. The closeness of the standard deviation shows the homogeneity of the respondents. They all agreed that the items are the student' practical skills performance on domestic installation in Technical Colleges in Rivers State.

Research Question 3: *What are the student' practical skills performance on industrial installation in Technical Colleges in Rivers State?*

Table 3: Mean and Standard Deviation on student' practical skills performance on industrial installation in Technical Colleges

S/NO	ITEMS	Teachers X	SD	RMK	Instructors X	SD	RMK
1	Proficiency in installing and configuring various types of industrial wiring systems, including three-phase systems.	3.23	.834	A	3.07	.838	A
2	Ability to set up and troubleshoot motor control circuits, including contactors, relays, and variable frequency drives (VFDs).	3.40	.821	A	3.09	.808	A
3	Skill in installing and maintaining electrical panels, including circuit breakers and distribution boards tailored for industrial applications.	3.09	.722	A	3.04	.947	A
4	Competence in performing load calculations to determine appropriate wire sizes, conduit types, and circuit configurations for industrial environments.	3.18	.658	A	3.19	.766	A
5	Proficiency in using specialized tools and equipment, such as conduit benders, cable pullers, and torque wrenches.	3.05	.924	A	3.12	.982	A
6	Ability to read and understand complex electrical schematics and blueprints for industrial systems.	3.19	.953	A	3.39	.774	A
7	Knowledge of and skill in installing safety devices, such as emergency stop buttons, fuses, and grounding systems.	2.99	.881	A	3.19	.860	A
8	Understanding of relevant electrical codes and industry standards (e.g., NEC, IEC) to ensure installations meet safety and regulatory requirements.	2.95	.990	A	3.26	.856	A
9	Ability to diagnose and resolve issues in industrial electrical systems, including identifying faulty components and implementing repairs.	2.98	1.033	A	3.32	.776	A
10	Skills in working effectively in teams, communicating clearly with colleagues and supervisors during installation projects.	3.19	1.043	A	3.21	.725	A
	Ground Mean	3.20	0.55	A	3.10	0.55	A

Table 3 revealed that the teachers had mean range of 2.95-3.40 and standard deviation of 0.65-1.04 while the Instructors had mean range of 3.04-3.36 and standard deviation of 0.72-0.98. The closeness of the

standard deviation shows the homogeneity of the respondents. They all agreed that the items are the student' practical skills performance on industrial installation in Technical Colleges in Rivers State.

Test of Hypotheses

HO_1 There is no significant difference between the mean responses of teachers and instructors on student' practical skills performance of basic electricity in Technical Colleges in Rivers State.

Table 4.: t-test analysis on student' practical skills performance of basic electricity in Technical Colleges**.**

Respondents	**N**	**X**	**SD**	**P-value**	**DF**	**t-Cal**	**t-Crit**	**RMK**
Teachers	40	3.18	0.50					
				0.05	58	-2.25	1.96	Sig
Instructors	20	2.97	0.62					

Result in table 4. revealed that t-cal (-2.25) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance oi basic electricity in Technical Colleges in Rivers State.

HO_2 There is no significant difference between the mean responses of teachers and instructors on student' practical skills performance on domestic installation in Technical Colleges in Rivers State.

Table 5 t-test analysis on student' practical skills performance on domestic installation in Technical Colleges**.**

Respondents	**N**	**X**	**SD**	**P-value**	**DF**	**t-Cal**	**t-Crit**	**RMK**
Teachers	40	3.29	0.50					
				0.05	58	-2.32	1.96	Sig
Instructors	20	3.10	0.51					

Result in table 5 revealed that t-cal (-2.32) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance on domestic installation in Technical Colleges in Rivers State.

HO_3 There is no significant difference between the mean responses of teachers and instructors on student' practical skills performance on industrial installation in Technical Colleges in Rivers State.

Table 6 t-test analysis on student' practical skills performance on industrial installation in Technical Colleges**.**

Respondents	**N**	**X**	**SD**	**P-value**	**DF**	**t-Cal**	**t-Crit**	**RMK**
Teachers	40	3.20	0.55					
				0.05	58	-3.44	1.96	Sig
Instructors	20	3.10	0.55					

Result in table 8 revealed that t-cal (-3.44) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance on industrial installation in Technical Colleges in Rivers State.

Summary of Findings of the Study

The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on basic electricity in Technical Colleges in Rivers State. Result in table 4.6 revealed that t-cal (-2.25) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and

instructors on student' practical skills performance of basic electricity in Technical Colleges in Rivers State.

The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on domestic installation in Technical Colleges in Rivers State. Result in table 4.7 revealed that t-cal (-2.32) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance on domestic installation in Technical Colleges in Rivers State.

The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on industrial installation in Technical Colleges in Rivers State. Result in table 8 revealed that t-cal (-3.44) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance on industrial installation in Technical Colleges in Rivers State.

DISCUSSION OF FINDINGS

The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on basic electricity in Technical Colleges in Rivers State. Result in table 4.6 revealed that t-cal (-2.25) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance oi basic electricity in Technical Colleges in Rivers State. Findings of the study is in line with Mulugeta (2018) who stated that Student performance in practical skills related to basic electricity is a critical area of focus in technical education. Research indicates that hands-on experiences significantly enhance comprehension and retention of theoretical concepts. For instance, a study by Mulugeta (2018) found that students engaged in practical applications of electrical principles demonstrated higher problem-solving skills and a deeper understanding of circuitry compared to those who relied solely on traditional lecture-based learning. This aligns with the constructivist approach to education, which emphasizes learning through doing, enabling students to grasp complex concepts through direct engagement with materials and tools. Furthermore, the integration of technology in teaching basic electricity can further bolster student performance. According to Smith and Johnson (2020), using simulations and virtual labs allows students to experiment with electrical circuits in a safe environment, fostering experimentation and critical thinking. These technologies provide immediate feedback, helping students identify mistakes and understand their implications in real-world contexts. As educators increasingly adopt these methods, it becomes evident that practical skills in basic electricity are not only essential for technical proficiency but also for preparing students for careers in a rapidly evolving technological landscape.

The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on domestic installation in Technical Colleges in Rivers State. Result in table 4.7 revealed that t-cal (-2.32) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance on domestic installation in Technical Colleges in Rivers State. Findings of the study is in line with Worrall et al. (2019) who explained that Student performance in practical skills related to domestic installation is crucial for developing competencies needed in the electrical trade. Research shows that hands-on training significantly enhances students' ability to apply theoretical knowledge to real-world scenarios. A study by Worrall et al. (2019) highlights that students who engage in practical projects, such as wiring and installing fixtures in a controlled environment, demonstrate improved accuracy and confidence in their skills. This experiential learning approach allows students to encounter common challenges and troubleshoot effectively, thereby reinforcing their understanding of safety standards and installation protocols. Moreover, the role of mentorship and collaborative learning cannot be overlooked in enhancing students' practical skills in domestic installations. According to a study by Lee and Kim (2021), peer-to-peer learning in workshop

settings fosters a supportive atmosphere where students can share insights and techniques, leading to a deeper understanding of complex installations. Additionally, access to modern tools and technologies, such as augmented reality applications for visualizing electrical systems, further enriches the learning experience. As the demand for skilled electricians continues to grow, focusing on practical training in domestic installation will be vital for equipping students with the necessary skills to succeed in the field.

The findings of the study revealed that teachers and instructors agreed that the items are the student' practical skills performance on industrial installation in Technical Colleges in Rivers State. Result in table 8 revealed that t-cal (-3.44) is higher than t-crit (1.96) which indicates that the hypothesis stated was rejected. Therefore there is a significant difference between the mean responses of teachers and instructors on student' practical skills performance on industrial installation in Technical Colleges in Rivers State. Findings of the study is in line with Bowers and McDonald (2020) who asserted that the development of practical skills in industrial installation is essential for students pursuing careers in electrical engineering and related fields. Hands-on training not only bridges the gap between theory and practice but also enhances students' ability to tackle complex installation tasks in industrial settings. According to Bowers and McDonald (2020), students who participate in structured industrial training programs show significantly improved performance in installing and troubleshooting electrical systems compared to those with minimal practical experience. These programs often include real-world projects that simulate actual industrial environments, allowing students to apply their knowledge in a context that closely resembles their future workplaces. Furthermore, the integration of safety protocols and standards during practical training is critical in preparing students for industrial installations. A study by Garcia and Thomas (2022) emphasizes that incorporating safety training into hands-on practice not only improves students' technical skills but also fosters a culture of safety awareness. Students who understand and prioritize safety measures are better equipped to manage risks associated with industrial electrical work. By focusing on comprehensive training that includes both technical skills and safety protocols, educational institutions can significantly enhance the preparedness of their students for the demands of the industrial sector.

CONCLUSION

Once teachers do proper research, use internet and get ready before teaching, learning will take place with or without the use of multimedia in the classroom. Also if technology is misused, it will be of no use to the students who the technology is being exposed to. Performance therefore is on individual basis. Students have a positive attitude towards the use of multimedia, this will therefore make them to show enthusiasm towards learning thereby causing a positive effect in their performance. The need for the use of multimedia in the teaching and learning process therefore cannot be overemphasized. However, an excessive use of multimedia may or may not improve the learning effectiveness. In order for multimedia to be effective, it should only be used in specific situations.

RECOMMENDATIONS

To enhance students' practical skills performance in electrical installation and maintenance works at technical colleges, several recommendations can be made:

1. Develop a curriculum that combines theoretical knowledge with extensive hands-on training. Incorporating real-world projects and simulations will help students apply what they learn in the classroom to practical scenarios, reinforcing their understanding and skill development.
2. Establish mentorship initiatives that connect students with industry professionals. This will provide students with guidance, insights, and feedback on their practical skills, fostering a deeper understanding of industry standards and best practices.
3. Invest in modern training facilities equipped with the latest tools and technology used in the electrical field. Access to current equipment and resources will ensure that students are familiar with the tools they will encounter in their future careers, enhancing their readiness for the workforce.

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