Educational Advancement and Development Journal (EADJ)
Volume 1 Number 2 December 2025, pp 1-12
E-ISSN: 3104-8390
https://neadafrica.com/journals/neadj

Practical Skills Needed by National Technical Certificate Students in Electrical Installation and Maintenance Work Operations for Job Creation in Rivers State, Nigeria

[1]Agwi, Vincent I.
Department of Industrial and Technology Education,
Alvan Ikoku Federal University of Education,
Owerri Imo State, Nigeria.
Email: agwivincent2019@gmail.com

[2]Njoku, Sylvanus U.
Department of Industrial Technology Education,
Michael Okpara University of Agriculture,
Umudike Abia State, Nigeria.

Abstract

The study determined practical skills needed by National Technical Certificate Students in Electrical Installation and Maintenance Work Operations for job creation in Rivers State Technical Colleges. Three research questions and three hypotheses guided the study. The design of the study was descriptive survey research deign. The area of the study was Rives State in the South-South geo-political zone of Nigeria. The population of the study was 84 respondents comprising 22 electrical technology teachers and 62 electrical technology NTC II students. There was no sampling. The instrument used for data collection was a well-structured instrument titled "Practical Skill needed by National Technical Certificate Students' in Electrical Installation and Maintenance Work Operations Questionnaire (PSNSEIMWQ). The instrument was face validated by three experts. The reliability of the instrument was determined through Cronbach alpha reliability coefficient method. A total of 15 respondents who were not part of the population of the study were used in testing the reliability of the study. The reliability coefficient of 0.75 was obtained. Data collected were analyzed using mean and standard deviation to answer the research questions, while t-res was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that electrical technology students' have little Practical Skills in electrical installation and maintenance work for job creation. It was recommended among others that electrical technology teachers should engaged students' undergoing training in electrical installation and maintenance work with more practical work/assignment on electrical installation and maintenance work operations.

Keywords: Practical skills, electrical installation and maintenance work, operation.

History:
Received : October 6, 2025
Revised : October 27, 2025
Accepted : November 30, 2025
Published : December 31, 2025
**Corresponding author: agwivincent2019@gmail.com*

Publisher: Network for Educational Advancement and Deve lopment

INTRODUCTION

Apprenticeship system of education which provided the youth with employment and learning of specific skills/trades with the use of hands is the traditional type of vocational education that existed before the period of colonial masters in Nigeria (Ugwu & Ilo, 2024). This type of Vocational Education was later replaced with Technical and Vocational system of education which became a formal system of education in Nigeria after the colonial period. Technical and Vocational Education according to Federal Republic of Nigeria (FRN, 2013) is the aspect of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge. In order to achieve and attain the objectives of Technical and Vocational Education, students should acquire the needed training from competent teachers' as to enable them perform better in the world of work so as to ensure that they are self-reliant upon graduation. Technical and Vocational Education is designed to provide theory and practical knowledge to individuals, and this type of training is provided to individuals who desire to work in an industry or commerce or in any electrical workshop that uses electrical power for their services (Jaja, 2022).

According to Idris and Abubaka (2019) for individual to acquire practical knowledge that will assist such individuals to perform better in the world of work such individual must undergo formal training in any of the recognized technical training institution, technical colleges included. Technical colleges in Nigeria are established to produce crafts-men at the craft level and master crafts-men at the advanced crat level Zimiro & Uboge (2022). The courses offered at the technical colleges leads to the award of National Technical Certificate (NTC) and Advance National Technical Certificate (ANTC). The curriculum programme of technical colleges according to Federal Republic of Nigeria (FRN, 2013) are grouped into related trades. These trades include' the Computer Trades, Building Trades, Wood work Trades, Mechanical Treads and Electrical/Electronic Trades. Electrical Installation and Maintenance Work Trade is a component of an electrical technology related trade offered in technical colleges in Nigeria. Okoye and Okwelle cited in Buba and Umaru (2023) described Electrical Installation and Maintenance work trade as electrical engineering trade offered in Nigerian technical colleges which has the technology potential to provide the needed solutions to the challenges of the Millennium.

The curriculum of the Electrical Installation and Maintenance Work Trade covers a period of three years and in the course of programme, learners are likely to use a variety of equipment and tools, culminating in the following behavioural objectives, demonstrate various experiments involving resistors, capacitors and inductors connection in series/parallel, install electrical machines, prepare and join electrical cables, install/connect batteries for charging system, use tools to dismantle, recoil and reassemble an electrical machines, undertake tests on installations and machines using appropriate tools, undertake both domestics and industrial installation (National Board for Technical Education, 2024). Components of Electrical Installation and Maintenance Work Trades include; Domestic Installation, Winding of Electrical Machines, Battery Charging and Repairs among others.

Domestic installation according to Ruto (2023) involves surfaces wiring, conduct wiring as well as maintenance of electrical fittings such as illumination tamps used in homes, mostly in 0.50 – 415v range. NBTE citied in Irona (2023) stated that the curriculum of domestic installation is intended to provide the trainees with knowledge and skills to enable him/her carryout complete electrical installation work in a building and its associated equipment's. Cookeley cited in Amadi, Nzenwa and Ezihe (2023) maintained that the goal of domestic installation is to provide the trainees with the knowledge and skills to enable him/her carryout electrical installation in a building. In the same vein, Roony (2018) stated that domestics installation operations comprise various kinds of electrical apparatus fixed in position ready for use, together with the necessary connecting conductor cables, fuses and control gears. Electrical installation operations also involve electrical working diagram, domestics surface wiring, domestics conductors wiring, principles of protecting electrical devices, inspecting and testing domestics installations, electrical fittings, such as illumination lamps used at homes. NBTE (2024) curriculum and course specification listed the following as skills need by students in domestic installation operations skills to carryout wiring of installation points, skill to cut conduit pipe with hack saw, skill to conduct polarity continuity and insulation test after installation. Santos and Gumpta (2021) also listed the following as operational practical skills that technical education students who are undergoing training in domestic installation needed; skills to handle tools and equipment correctly, skill to appropriately select materials for work, skill to install conduit pipe, skill to use correct type of testing equipment such as ammeter and voltmeter for testing operation after installation.

Winding of electrical machines is another component of electrical installation and maintenance work trade as offered in technical colleges in Nigeria. Nworgu (2019) stated that the goal of winding of electrical machines is aimed at providing the trainees with the knowledge and skills to enable him/her wind or rewind AC and DC rotating/static machines up to 10KVA. According to NBTE (2014) the general objectives of winding of electrical machines include; that trainees should be able to understand and apply all statutory regulations during electrical winding work, identify and select appropriate tools and equipment used for winding jobs, acquire skills for preparation and interpretation of winding drawing, understand the winding of burnt static/rotating machines and others. According to Maxwell and Jantenz (2022) winding of electrical machines operations involves the use of hand tools to dismantle and rewind burnt coils in DC and AC Machines. Similarly, Bread (2022) stated that winding of electrical machines involves both winding and rewinding of electrical generators and motors. Electrical motors and generators are electrical machines used to convert mechanical energy into electrical energy by electromagnetic means. The construction of such machines involves set of conductors wound in stators or rotor of machine in electrical installation (Kenz, 2023). There are five kinds of winding namely; hand winding, random winding, form winding, skill winding and concentric winding. Winding of electrical machines operation according to Miller (2021) include; dismantling the motor, data clearing of the core, insulating the stator slots, winding the coils, coils connection, mechanical repairs of armature, checking the bearing of armature re-assembling the motor and carrying out dynamic test on motor after rewinding operation. Odii and Ekewuba (023) stated that to train students to acquire relevant skills that technology education teachers are required to completely use appropriate teaching methods and utilization of needed workshop facilities in developing the students. Electrical installation and maintenances work operations require the use of appropriate tools, equipment and machine to train the students in the workshop in order to help the students; to acquire practical skills during the period of their training.

Battery charging and repairs operations is another electrical installation and maintenance work trade component offered in technical colleges in Nigeria. The general goal of battery charging and repairs is to provide the trainee with the knowledge and skill to maintain, repair and charge batteries effectively. On the completion of the module NBTE (2014) stated that the trainee should be able to; understand the working principles of a cell and the constructional feature of a battery, maintain, repair and charge batteries. Battery charging operations is essential in any electrical workshop. According to Hillton (2023) the basic purpose of battery charging and repairs is to demonstrate connection of cells primary and secondary and install batteries for charging. There are different types of material that are used for battery charging and repairs operations which include; cells, battery, electrolyte, acid and water. According to Basil and Ukpo (2024) some of the activities that the students are expected to carry out during battery charging and repairs operations include; to demonstrate how to connect cells, show how to construct simple cell/battery, connect batteries in both series and parallel connections, demonstrate how to prepare mixed electrolyte for battery demonstrate how to connect battery for trickle and float equalizing charge show how to measure the specific gravity of electrolyte, demonstrate how to operate battery charging machine and others.

There are so many operations which can be performed by the students in the workshop during battery charging and repairs. NBTE (2014) curriculum and course specification listed the following as skills needed by students in battery charging and repairs operations, skill to demonstrate how to prepare and replaced damaged battery cells, skill to operate battery charging machine, skill to observe charging conditions of battery, skill to connect battery for equalizing charges, skill to construct simple cell/battery. According to Kuta (2019) operational

practical skills that technical education students who are undergoing training in battery charging and repairs in technical colleges needed are; skill to handle battery charging and repairs tools and equipment correctly, skill to use hydrometer to test specific gravity, skill to show how to defect the condition of cells in a battery, skill to repair and replace faulty cells, skill to seal battery tops with sealing compound skill to prepare mixed electrolyte for battery charging.

Thus, electrical installation and maintenance work operation can only be achieved through constant practices, that is; the more students carryout practices in electrical installation operations the more the students will become proficient. This practice can be achieved through technical education whose purpose is production of technicians who can acquire practical and applied skills as well as basic scientific knowledge. Hence, there is need to determine the practical skills needed by National Technical Certificate students in Vocational related areas such as in Electrical Installation and Maintenance Work operations for job creation in Rivers State.

Statement of the Problem

Despite the importance of producing skilled and competent personnel for achieving the goal of technological; development in Nigeria, the teaching and learning of technological related courses in some technical training institutions in Nigeria generally appear to be unsatisfactory. Therefore, there were complaints from both private and public enterprise that the NTC electrical installation and maintenance work students are not performing very well in the area of electrical installation and maintenance work practical skills. Bread (2022) observed that some National Technical Certificate students who majored in electrical technology related trades do not perform very well in the industry when they are employed to work. Also, Odii and Ekewuba (2023) observed that most students that offered electrical technology related trades lack practical skills. Thus, they cannot perform competently, hence the focus of this study is practical skill needed by NTC students in electrical installation and maintenance work operations. The practical skills needed by the NTC students in electrical installation and maintenance work specifically, domestic installation, winding of electrical machines, battery charging and repairs operations is a function of the quality of training received from electrical technology teachers who are expected to be highly knowledgeable, skilled and capable of transferring the curriculum content into action using the appropriate steps/stages. In most cases the inability of the teachers to utilize basic academic skills that comprise pedagogical skills and knowledge of the subject matter (both theory and practical) affect practical skills training. In the light of the foregoing, it therefore becomes imperative to determine practical skills of National Technical Certificate students in electrical installation and maintenance work operations in technical colleges in Rivers State in order to address the specific areas of weakness so as to make necessary improvement in technical college programmes in Nigeria.

Purpose of the Study

The main purpose of the study was to determine practical skills needed by National Technical Certificate students in electrical installation and maintenance work operations for job creation in Rivers State. Specifically, the study sought to:

1. Identify practical skills needed by National Technical Certificate students in domestic installation operations for job creation in Rivers State
2. Identify practical skills needed by National Technical Certificate students in winding of electrical machines operations for job creation in Rivers State.

3. Identify practical skills needed by National Technical Certificate students in battery charging and repairs operations for job creation in Rivers State

Research Questions

The following research questions guided the study:

1. What are the practical skills needed by NTC electrical installation and maintenance work students in domestics installation operations for job creation in Rivers State?
2. What are the practical skills needed by NTC electrical installation and maintenance work students in winding of electrical machines operations for job creation in Rivers State?
3. What are the practical skills needed by NTC electrical installation and maintenances work student' in battery charging and repairs operations for job creation in Rivers State?

Hypotheses

The following null hypotheses were formulated to guide the study and was tested at 0.05 level of significance:

Ho_1: There is no significant difference in the mean responses of teachers and students on the practical skills needed by NTC electrical installation and maintenance work students in domestic installation operations for job creation in Rivers State.

Ho_2: There is no significant difference in the mean responses of teachers and students on the practical skills needed by NTC electrical installation and maintenance work students in winding of electrical machine operations for job creation in Rivers State.

Ho_3: There is no significant difference in the mean responses of teachers and students on the practical skills needed by NTC electrical installation and maintenance work students in battery charging and repairs operations for job creation in Rivers State.

METHODOLOGY

A descriptive survey design was adopted for the study. Descriptive survey research design according to Nworgi cited in Agwi & Madakolam (2023) is a design in which a group of people or items are studies by collecting and analyzing data from a few people or items considered to be the representative sample. The population for the study was 84 respondents comprising 22 electrical technology teachers' and 62 electrical technology NTC 11 students' from the four technical colleges owned by Rivers State government in 2024/2025 academic session. Due to the small size of the population, the entire population was used for the study, and therefore, there was no sampling for the study.

The instrument that was used for data collection for the study was a structured questionnaire, which was developed by the researcher. The instrument was titled "Practical Skills Needed for Electrical Installation and Maintenance Work Operation Questionnaires (PSNEIMWQ)". The instrument consisted of 54 skills items that provided answers to the researcher questions raised. A four-point scale was used to determine the level of training needed by NTC students' using the response options of High Needed (HN) = 4, Needed (N) = 3, Not Needed (NN) = 2, Highly Not Needed (HNN)=1. The instrument was face validated by three experts in the Department of Technology Education, Rivers State University, Port

Harcourt. Cronbach alpha reliability technique was used to determine the internal consistency of the items of the questionnaire. The reliability coefficient obtained was 0.75. A total of 84 copies of the instrument were administered to the respondents directly by the researchers with the help of five research assistants.

The total number of the instrument retrieved after two weeks was 82 (22 teachers and 60 students) representing 98% retrieved rate and was used for data analysis. The data collected from the respondents were analyzed using mean and standard deviation while t-test were utilized to test the hypotheses at 0.05 level of significance. A mean of 2.50 was used for decision making. Therefore, any item with a mean of 2.50 and above responses was regarded as Needed option, and any item whose mean falls below 2.50 was regarded as Not Needed option. In testing the hypotheses, if the calculated t-value is less than the critical t-value the hypothesis was accepted otherwise the hypothesis was rejected. The computation of the mean, standard deviation and T-calculated was carried out with Statistical Package for Social Sciences (SPSS).

RESULTS

The results of the study are presented in Tables-1-6 in line with the research questions and hypotheses.

Research Question 1: what are the practical skills needed by NTC electrical installation and maintenance work students in domestic installation operations for job creation in Rivers State.

Table 1: Mean and Standard Deviation Rating on Practical Skills Needed by NTC Electrical Installation and Maintenance Work Students in Domestic Installation Operations

S/N	Skills needed in Domestics Installation Operations	Teachers' N = 22			Students' N = 60		
		M	SD	Remark	M	SD	Remark
1.	Draw electrical installation layout	2.70	0.69	Needed	2.81	0.70	Needed
2.	Interpret electrical installation drawing	2.61	0.62	Needed	2.75	0.68	Needed
3.	Mark out cable runs on wiring surface	2.83	0.70	Needed	3,05	0.81	Needed
4.	Assemble cables and accessories on the wiring board	2.92	0.73	Needed	2.81	0.75	Needed
5.	Fix cable to a surface	3.10	0.91	Needed	2.78	0.71	Needed
6.	Use plum and spirit level to check work	2.98	0.78	Needed	2.69	0.70	Needed
7.	Bend permissible redial length of conduit	3.05	0.90	Needed	2.92	0.74	Needed
8.	Prepare conduct for installation	2.85	0.73	Needed	3.06	0.94	Needed
9.	Draw in cables in a conduit pipe using wire	3.11	0.92	Needed	2.75	0.72	Needed
10.	Test installation points	3.00	0.89	Needed	2.63	0.70	Needed
11.	Identify common types of protective devices	3.06	0.92	Needed	2.78	0.71	Needed
12.	Install circuit breakers	2.78	.075	Needed	2.61	0.70	Needed
13.	Earth electrical installation materials	3.01	0.93	Needed	2.97	0.73	Needed
14.	Visually detect electrical and mechanical loose connections	2.98	0.81	Needed	2.67	0.71	Needed
15.	Conduct polarity continuity and insulation tests	3.04	0.91	Needed	2.95	0.79	Needed
16.	Connect black cable of the switch to the red cable of the lamp	2.69	0.84	Needed	2.55	0.70	Needed
17.	Bend conduct	2.78	0.85	Needed	2.58	0.71	Needed
18.	Tighten the conduit on the well surface	3.16	0.96	Needed	2.83	0.74	Needed
19.	Install fuses during installation	3.18	0.98	Needed	2.81	0,73	Needed
20.	Select the appropriate socket for installation work	3.15	0.94	Needed	2.96	0.79	Needed
	Average Mean/SD	**3.05**	**0.85**		**2.96**	**0.72**	**Needed**

Source: Field survey, 2025.

The results in Table 1 revealed that National Technical Certificate students in electrical installation and maintenance works trade needed all the 20 practical skills in domestics installation operations for job creation in Rivers State. Mean scores for each of the 20 items exceed 2.50 which is the cut-off point. The practical skills have their standard deviation ranged from 0.69 to 0.92 for the teachers and 0.68 to 0.94 for the students. This indicate that the respondents were close to one another in their opinion and were also not too far away from the mean.

Hypothesis 1: There is, no significant difference in the mean responses of teachers' and students on the practical skills need by NTC electrical installation and maintenance work students in domestic installation operations for job creation in Rivers State.

Table 2: t-test Analysis of Teachers' and Students on Practical Skill needed by NTC Electrical Installation and Maintenance Work Students in Domestic Installation. Operations for job creation in Rivers State

Category	N	M	SD	Df	Sign. Level	t-cal.	t-crit.	Decision
Teachers	22	3.05	0.85					
				80	0.05	0.41	1.96	Accepted
Students	60	2.95	0.72					

Table 2 shows that the calculated t-test was 0.41 which was less than the t-critical of 1.96 at 80 degrees of freedom. Therefore, the first null hypothesis was accepted. Thus, there was no significant difference between teachers and students on the practical skills needed by NTC electrical installation and maintenance work trade students in domestic installation operation for job creation in technical colleges in Rivers State.

Research questions 2: what are the practical skills needed by NTC electrical installation and maintenance work students in winding of electrical machines operations for job creation in Rivers State.

Table 3: Mean and Standard Deviation Rating on Practical Skills Needed by NTC Electrical Installation and Maintenance Work Students; in Winding of Electrical Machines Operations

S/N	Skills needed in Winding of Electrical Machines Operations	Teachers' N = 22			Students N = 60		
		M	SD	Remark	M	SD	Remark
21.	Prepare and interpret simple wave winding drawing	2.93	0.78	Needed	2.85	0.70	Needed
22.	Prepare and interpret lap winding drawing	2.84	0.75	Needed	2.74	0.70	Needed
23.	Determine coil span per pitch, per phase	2.71	0.70	Needed	3.00	0.89	Needed
24.	Draw the position of coil on commutator/strip[rings	2.87	0.76	Needed	3.05	0.90	Needed
25.	Dismantle the machines parts	3.16	0.91	Needed	3.08	0.92	Needed
26.	Check to notice winding connection pitch cross sectional area	3.14	0.89	Needed	2.91	0.79	Needed
27.	Fix and replace brush	3.25	0.93	Needed	2.88	0.76	Needed
28.	Select types of conductors used in winding	2.89	0.75	Needed	2.68	0.72	Needed
29.	Construct winding formers	2.59	0.72	Needed	2.73	0.74	Needed
30.	Prepare winding coil	3.01	0.88	Needed	2.65	0.71	Needed
31.	Fix winding coils in their slots	2.91	0.74	Needed	3.02	0.90	Needed
32.	Connect winding using the prepared data	3.08	0.87	Needed	3.00	0.89	Needed
33.	Determine the effectiveness of a commutator	2.94	0.73	Needed	2.96	0.75	Needed
34.	Inspect for good ball bearing of a machine	2.87	0,70	Needed	2.57	0.71	Needed
35.	Assemble parts systemically	2.81	0.73	Needed	3.03	0.93	Needed
36.	Apply greases to appropriate parts	2.71	0.70	Needed	3.09	0.74	Needed
37.	Test for continuity and insulation resistance	3.04	0.85	Needed	2.82	0.76	Needed
38.	Test run the machine ensuring correct rotation	2.86	0./71	Needed	2.79	0.74	Needed
39.	Test for speed with tachometer	2.59	0.69	Needed	2.91	0.78	Needed
	Average Mean/SD	**3.01**	**0.79**		**2.78**	**0.71**	

The results in Table 3 revealed that National Technical Certificate Student's in electrical installation and maintenance work trade needed all the 19 practical skills in winding of electrical machines operations for job creation in Rivers State. Mean scores for each of the 19 items exceed 2.50 which is the cut-off point. The practical skills have their standard deviation ranged from 0.69 to 0.93 for the teachers' and 0.70 to 0.94 for the students'. This indicate that the respondents were close to one another in their opinion and were also not too far away from the means.

Hypothesis 2: There is no significant difference in the mean responses of teachers and students on the practical skills needed by NTC electrical installation and maintenance work students in winding of electrical machines operations for job creation in Rivers State.

Table 4: **t-test Analysis of Teachers' and Students on Practical Skills needed by NTC Electrical Installation and Maintenance Work Students in Winding of Electrical Machines Operations for Job Creation in Rivers State**

Category	N	M	SD	Df	Sign. Level	t-cal.	t-crit.	Decision
Teachers	22	3.01	0.89					
				80	0.05	0.52	1.96	Accepted
Students	60	2.87	0.71					

Table 4 shows that the calculated t-test was 0.52 which was less than the t-critical of 1.96 at 80 degrees of freedom. Therefore, the second null hypothesis was accepted. Thus, there was no significant difference between teachers and students on the practical skills needed by NTC electrical installation and maintenance work trade students in winding of electrical machines operations for job creation in technical colleges in Rivers State.

Research Questions 3: What are the practical skills needed by NTC electrical installation and maintenance work students in battery charging and repairs operations for job creation in Rivers State.

Table 5: Mean and Standard Deviation Rating on Practical Skills Needed by NTC Electrical Installation and Maintenance Work Students in Battery Charging and Repairs Operations.

S/N	Skills needed in Battery Charging and Repairs Operation	Teachers' M N = 22			Students' N = 60		
		M	SD	Remark	M	SD	Remark
40.	Identify types of cells	2.91	0.76	Needed	2.85	0.71	Needed
41.	Identify the various parts of the cells	2.88	0.75	Needed	2.61	0.73	Needed
42.	Construct a simple cell of battery	3.17	0.91	Needed	2.87	0.78	Needed
43.	Select materials, equipment and tools used for battery charging	2.98	0.87	Needed	2.71	0.74	Needed
44.	Observe polarity and terminal	2.83	0.71	Needed	2.63	0.7	Needed
45.	Use apocopate method of charging batteries	3.14	0.90	Needed	2.59	0.69	Needed
46.	Demonstrate connection of cells	3.11	0.89	Needed	2.65	0,73	Needed
47.	Connect batteries for changing	3.00	0.87	Needed	2.71	0.74	Needed
48.	Prepare electrolyte for battery use	2.67	0.67	Needed	2.83	0.76	Needed
49.	Connect batteries for equalizing charges	2.74	0.68	Needed	2.61	0.73	Needed
50.	Measure the specific gravity of electrolyte	3.05	0.87	Needed	2.59	0.69	Needed
51.	Use hydrometer to determine the specific gravity of electrolyte	2.95	0.85	Needed	2.72	0.75	Needed
52.	Connect battery to observe the changing conditions	2.86	0.83	Needed	2.58	0.67	Needed
53.	Operate charging machine to charges batteries	2.83	0.81	Needed	2.61	0.73	Needed
54.	Prepare and replaced damage battery cells	2.96	0.87	Needed	2.82	0.75	Needed
	Average Mean/SD	**2.83**	**0.81**		**2.64**	**0.75**	

Source: Field Survey, 2015.

The results in table 5 revealed that National Technical Certificate student in Electrical Installation and maintenance work trade needed all the 15 practical skills in battery charging and repairs operations for job creation in Rivers State. Mean scores for each of the 15 items exceed 2.50 which is the cut-off point. The practical skills have their standard deviation ranged from 0.67 to 0.91 for the teachers' and 0.69 to 0.78 for the students'. This indicated that the respondents were close to one another in their opinion and were also not too far away from the mean.

Hypothesis 3: There is no significance difference in the mean responses of teachers and students on the practical skills needed by NTC electrical installation and maintenance work students in battering charging and repairs operations for job creation in technical colleges in Rivers State.

Table 6: t-test Analysis of Teachers' and Students on Practical Skills needed by NTC Electrical Installation and Maintenance Work Students in Battery Charging and Repairs Operations for Creation in Rivers State

Category	N	M	SD	Df	Sign. Level	t-cal.	t-crit.	Decision
Teachers	22	2.83	0.81					
				80	0.05	-0.61	1.96	Accepted
Students	60	2.84	0.75					

Table 6 shows that the calculated t-test was 0.62 which was less than the t-critical of 1.96 at 80 degrees of freedom. Therefore, the third null hypothesis was accepted. Thus, there was no significant difference between teachers and students on the practical skills needed by NTC electrical installation and maintenance work students in battering charging and repairs operations for job creation in technical colleges in Rivers State.

Findings of the study

The following are the findings of the study:

1. Twenty domestic installation operational skills were identified by the respondents as practical skills needed by National Technical Certificate students in electrical installation and maintenance work trade for job creation in Rivers State.
2. Nineteen winding of electrical machines operational skills were identified by the respondents as practical skills needed by National Technical Certificate students in electrical installation and maintenance work trade for job creation in Rivers State.
3. Fifteen battery charging and repairs operational skills were identified by the respondents as practical skills needed by National Technical Certificated students in electrical installation and maintenance work trade for job creation in Rivers State
4. There was no significant difference in the mean responses of teachers and students on the practical skills needed by NTC electrical installation and maintenance work trade students in battery charging and repair operations for job creation technical colleges in Rivers State.

Discussion of Findings

The findings in research question 1 on practical skills needed by national technical certificate students in domestic installation operations for job creation in Rivers State revealed that teachers and students agreed that practical skills are needed by electrical installation and maintenance work trade students in domestic installation operations. Similarly, the hypothesis testing indicated no significant difference in the opinion of teachers and students in technical colleges in Rivers State on the practical skills needed by NTC electrical installation and maintenance work students in domestic installation operation for job creation. These findings are in agreement with NABTEB (2014) curriculum and course specification where all the skill

items are reflected as practical guide for training electrical installation and maintenance work students. This finding is also in agreement with Santos and Gumpta (2021) who listed many operational practical skills such as skill to appropriately select materials for work, skill to install conduit pipe, skill to use correct type of testing equipment to verify fault, skill to prepare conduit for installation and skill to assemble cables and accessories on the wiring surface as skills which can be performed by students during domestic installation.

Findings in research questions 2 on practical skills needed by national technical certificate students in winding of electrical machines operations for job creation in Rivers State revealed that teachers and students agreed that electrical installation and maintenance work trade students needed practical skills in all the 19 skills items in winding of electrical machines operations. Similarly, the hypothesis testing indicated no significant difference in the opinion of respondents of teachers and students in technical colleges in Rivers State on the practical skills needed by NTC electrical installation and maintenance students in winding of electrical machine operation for job creation. The finding of the study agrees with Miller (2021) who posited that operational skills in winding of electrical machines include; skill to dismantle the motor, skill to take data about the number of coils, skill to remove the old winding and clearing of the core. This finding is also in agreement with Odii and Ekewuba (2023) who stressed that technical course teachers are required to completely use appropriate teaching methods and utilization of needed workshop facilities in developing the students' practical skills needed.

The findings from research question 3 on practical skills needed by national technical certificate students in battery charging and repairs operations for job creation in Rivers State revealed that teachers and students agreed that electrical installation and maintenance work trade students needed practical skills in all the 15 skills items in battery charging and repairs operation. Similarly, the hypothesis testing indicated no significant difference in the opinion of respondents of teachers and students in technical colleges in Rivers State on the practical skills needed by NTC electrical installation and maintenance students in battery charging and repair operation for job creation. The finding of the study agrees with Kuta (2019) who stated that operational practical skills that technical education students who are undergoing training in battery charging and repairs in technical colleges needed are; skill to handle battery charging and repairs tools and equipment correctly, skill to use hydrometer to test specific gravity, skill to show how to detect the condition of cells in a batter, skill to repair and replace faulty cells, skills to seal battery tops with sealing compound.

CONCLUSION

Based on the results of this study it was deduced that electrical installation and maintenance work trade students in Rivers State needed adequate practical skills in electrical installation and maintenance work operations i.e. domestic installation, winding of electrical machines and battery charging and repairs operations for job creation upon graduation.

RECOMMENDATIONS

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

1. All the skill items rated as needed identified in the study should be taught adequacy in the workshop by the teachers to electrical installation and maintenance work trade students to prepare them skillfully prior to their graduation.

2. Electrical installation and maintenance work trade teachers should ensure that they spend more time in practical classes in the workshop with the students.
3. Electrical installation and maintenance work teachers should give more attention in areas of difficulties, especially during, installation of electrical cable and accessories, testing of installation points, dismantling of machine parts and safety precautions so as to engage students with practical skills on electrical installation and maintenance work i.e. domestic installation. Winding of electrical machines and battery charging and repairs.

REFERENCES

Agwi, V.I. & Maduakolam, U.A (2023). Impact of in-service training programme on technology education teachers job performance in technical colleges in Rivers State. *Journal of Academic Excellence*. 15 (1), 30 – 45.

Amadi, I.A. Nzenwa, T. &Ezihe, E. (2023). Effect of Smart Phones Instructional Techniques on Students' Academic Achievement in Electrical Installation and Maintenance Works in Technical Colleges in Rivers State. *Journal of Science & Industrial Technical Education* 6(1), 32-45.

Basil, W. T. &Ukpo, C. (2024). *A Hand Book on Electrical Installation and Maintenance Work Trade for Technical College Students*. Gravel Publisher Ltd.

Bread, V.N. (2022) *Electrical Installation and Maintenance Work Practical Guide*: Jaz Publishing Company.

Buba, N. S. &Umaru, A. (2023). Effect of Instructional Materials on Students Electrical Installation and Maintenance Work Achievement in Technical Colleges in Kano State. *International Journal of Educational Research*. 10 (1), 100-115. http//www.edu.org

Federal Republic of Nigeria (2013). (*National Policy on Education (Revised 6th Edition*) Lagos; Nigerian Educational Research and Development Council (NERDC).

Hilton, B.E. (2023). An Assessment of Students Practical Performance on Electrical Installation Skills in Technical Colleges in London. *Journal of Technology Education,* 8(1), 20-35. http//www.edu.org.

Idris, A. &Abubaka, M.S. (2019). Technical and Vocational Education and Training: A Useful Mean of Acquiring Skills for Employment. *Journal of Vocational and Technology Education.* 9(1), 10 -15 httpp//www.edu.journal.org.

Irona, G.E. (2023). Critical Appraisal and Evaluation of Teaching and Learning Electrical Installation and Maintenance Work Trade in Technical Colleges in Imo State. *Journal of Technical and Vocational Education.* 8(1), 80-95.

Jaja, B.C. (2022). Professional Skills Capacity. Building Needs of Teachers of Technology Education for Effective Teaching of Electrical Installation Work in Technical Colleges in Rivers State. *Nigerian Vocational Association Journal*. 16(1), 20-35.

Kenz, W. O. (2023), *Principles of Electrical Machines*. Slangton Publishers Ltd.

Kuta, E.M. (2019). *Electrical Principles for Installations Craft Students*. Maximum Publisher ltd.

Maxwell, U.E. & Jantez, A. (2022) *Electrical Installation Work II*: Megrew Hill Publishers Ltd.

Miller, U.S. (2021). *Electrical Installation Technology. The English Languages Book*.: Itarap Publishing Company.

National Board for Technical Education (2014). *Electrical Installation and Maintenance Works Curriculum and Course Specification.* Kaduna: NBTE Publication.

Nworji, G.M. (2019). *Electrical Installation for Electrical Engineering Students: Theory and Practical*. Global Publishing Company. Ltd.

Odii, M. & Ekewuba, C. T. (2023). Assessment of Technical Training Facilities in Technical Colleges in Abia State. *Journal of Education in Developing Areas.* 9(1), 40-55. http//www.edu.org.

Ruto, L.M. (2023). *Fundamentals of Electrical Installation and Maintenance Work*. Acra: Zeb Publishing Company. Ltd.

Roony, C.F. (2018). *Hand Book on Electrical Installation: Theory and Practice*. Jef Publishing Company.

Santos, G & Gumpta, E. (2021). *Practical Guide on Electrical Installation Work*. Climax Pushers Ltd.

Ugwu, A & Ilo, M.N. (2024). Technical Education the Key to Sustainable Technological Development in Nigeria. *Journal of Academic Excellence.* 14(1), 80-95. http//www.edu.org.

Zimior L.E & Uboge, M.F. (2022). The Challenges Technical Education Programme in Nigerian Universities. *International Journal of Educational Research.* 11(1), 60-75. http//www.gogle.com.