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AVAILABILITY AND UTILIZATION OF FACILITIES OF ELECTRICAL INSTALLATION AND MAINTENANCE WORKS PROGRAMME OF TECHNICAL COLLEGES IN NORTH-EAST GEO-POLITICAL ZONE OF NIGERIA

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ABSTRACT: *The study investigated the availability and utilization of Electrical Installation and Maintenance Works Programme of technical colleges in the North-East Geo-political Zone of Nigeria. Two purposes of study were examined. Two research questions were answered and two hypotheses were tested. The population of the study was 808, made up of 24 principals, 58 teachers, 18 workshop attendants and 708 students. The study chose 40% of the population as the sample for the study, which stood at 398, made up of 10 principals, 26 teachers, 10 workshop attendants and 352 students. A structured questionnaire collected data from respondents. It was validated by five experts. A trial test using the test re-test method established the coefficient of stability of the instrument which stood at 0.94. After the administration of the instrument, 440 valid copies were obtained, made up of 10 principals, 22 teachers, 10 workshop attendants and 308 final year students. Analysis of the results was carried out on the valid copies of the instrument. Mean and standard deviation were used to answer the research questions. The analysis of variance was used to test the hypothesis at 0.05 level of significance. Findings of the study showed that equipment, tools and measuring instruments were moderately available. They included conduit bending machine, battery charger, direct-on-line starter, Allen keys, A.C. meters, rheostat, installation varnish and capacitors. Consumable materials were highly available. They included ceiling roses, cables wiring nails and resistors. Students' level of utilization of equipment, tools and consumable materials during practical lessons was of moderate performance. Students' level of utilization of measuring instruments during practical lessons was low in 12 out of 15 measuring instruments. On the whole, students' level of utilization of measuring instruments during practical lessons was of low performance. A significant difference did not exist, at the chosen probability level, in the mean responses of principals, teachers and workshop attendants on the extent to which facilities for the Electrical Installation and Maintenance Works Programme were available. At a 0,05 level of significance, there was no significant difference in the mean responses of teachers, workshop attendants and students on the level of utilization of consumable materials by students during practical lessons. The study suggested among others, an improvement in facilities supply and an increase in students' practical activities for enhanced performance.*

KEYWORDS: Availability, Utilization, Facilities, Programme, Installation, Maintenance

INTRODUCTION

Electrical Installation and Maintenance Works Programme is one of the TVE programmes which, according to the curriculum of the programme (National Board for Technical Education, NBTE, 2003) provides training that leads to the production of skilled personnel like craftsmen and technicians who could either secure employment at the end of their

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training, set up their own businesses or further their studies in Polytechnics, Colleges of Education (Technical) and Universities. The curriculum of the Electrical Installation and Maintenance Works programme covers a period of three years. In the course of the programme, students are expected to use a variety of tools and equipment, culminating in the following behavioural objectives: 1) Demonstrate various experiments involving resistors, capacitors and inductors (Series/parallel connection); 2) Undertake both domestic and industrial installation; 3) Install electrical machines; 4) Prepare and join electrical cables; 5) Install/connect batteries for charging systems; 6) Use tools to dismantle, recoil and recouple an electrical machine (generator or motor); and 7) Undertake tests on installations and machines using appropriate tools (NBTE, 2003)

All the above skills require the use of practical teaching. That is why the Nigeria National Policy on Education (FGN, 2004) specifies that the approach to instruction is both class teaching and practical work. Practical teaching, according to Omosewo (2000) develops in students, appreciation of the spirit and methods of problem solving. Andural and Ikyumen (2006) added that today a lot emphasis is being placed on practical teaching which prepares recipients for various occupations. That is why the National Board for Technical Education (NBTE, 1992) Standards and Criteria for Accrediting Programmes in Technical Colleges, recognizing the importance of practical teaching, recommended that the class size for workshop practical work shall be 15 – 20 students and the teacher-student ratio shall be kept at 1:20.

Physical facilities play vital roles in students' learning, for without them, according to Omosewo (2000) practical work is very difficult to organize. That was why Yaduma and Moses (2005:82) stressed that "For technical and vocational education to achieve its objectives, equipment, materials and tools (workshop facilities) must be available and adequate." Omosewo (2000), Ngada (2001) and Yakubu and Mumah (2001) concluded that for any meaningful TVE programme, facilities are indispensable.

The curriculum of the Electrical Installation and Maintenance Works Programme (NBTE, 2003) provides a list of facilities and equipment that is required in running the programme. It was this list that the study addressed. It was necessary to address that aspect of the programme because students failed their examinations due largely to lack of available relevant educational facilities, resulting in their being inefficient, ineffective and unemployable (Olaitan, Nwachukwu, Onyemachi, Igbe and Ekong, 1999). Consequently, in the words of Olaitan (1996), Njoku (1997), Abubakar (2000) and Jen (2002), employers of labour were dissatisfied with the level of preparation of the graduates as the graduates were unable to meet the employment requirements of the employers. Therefore, since facilities in TVE are related to students' academic achievement, (Abubakar, 2000; Alio, 2001; Akpa, 2003; Okoro, 2006), this study seeks to obtain empirical data by evaluating the facilities of the Electrical Installation and Maintenance Works Programme of technical colleges in the North- East of Nigeria.

Purpose of the Study

The study had the following specific purposes

1. Ascertain the extent to which facilities for EIMW programme are available for a minimum class size

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2. Determine the level of utilization of EIMW facilities by students during practical lessons

Research Questions

The following research questions were formulated to which answers were sought

1. To what extent are facilities for EIMW programme available for a minimum class size?
2. What is the level of utilization of the EIMW facilities by students during practical lessons?

Hypotheses

The following hypotheses were stated and tested at 0.05 level of significance:

Ho_1: There is no significant difference in the mean responses of principals, teachers and workshop attendants on the extent to which facilities are available for a minimum class size

Ho_2: There is no significant difference in the mean scores of teachers, workshop attendants and students on the level of utilization of facilities by students during practical lessons

REVIEW OF RELEVANT LITERATURE

The study was based on the decision-oriented study of the values-oriented approach to evaluation studies which, according to Stufflebeam and Webster (1986), deals with and relates to decision making, stressing that "The decision-oriented study emphasizes that evaluation should be used proactively to improve a programme as well as retroactively to judge its worth" (p.33). Stufflebeam and Webster (1986:33) stressed that the main advantage of the decision-oriented study is that the strategy "encourages educators to use evaluation continuously and systematically in their efforts to plan and implement programs that will meet educational goals." Steinmetz (1986) asserted that evaluation normally involves making comparisons, stressing that for an effective evaluation exercise, standards must be set. The standards, according to Steinmetz (1986) refer to the list or description of the qualities or characteristics (guidelines) for making decisions. For this study, the curriculum of the Electrical Installation and Maintenance Works programme was seen as a standard document which specifies not only teaching and learning experiences but also a list of facilities essential for the effective implementation of the programme. The list of facilities in the curriculum of the programme is therefore, the standard against which issues are considered for effecting decisions.

Castaldi (1994) stated that educational facilities are those material or services that facilitate teaching and learning in school." Onyejemezie (1991), Ibe (1998), Esomonu (2002) and Jen (2002) agreed that educational facilities in our institutions are equipment, tools, learning/instructional materials, consumable materials and infrastructure (classrooms, assembly halls, libraries, laboratories and workshops). All these facilities agree with the TVE resources specified by the National Board for Technical Education (NBTE, 2003), thus: 1) Tools, equipment and training materials 2) Teaching and technical/administrative support

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staff 3) Infrastructural facilities which include administrative blocks, health centre, conveniences, workshops, laboratories, libraries…4) Utility services such as water, electricity and communication facilities (Yakubu & Mumah, 2001:225).

Educational facilities for this study referred to all the physical resources as listed in the curriculum of the Electrical Installation and Maintenance Works programme. The list includes workshops, laboratories, tools and equipment, instruments and consumable materials. The focus of the study is to evaluate the availability and utilization of the facilities with a view to providing useful data that will aid in a meaningful decision making.

The availability of physical facilities for the implementation of Electrical Installation and Maintenance Works Programme is of crucial importance. However, several years ago many technical schools in Nigeria were without the facilities (Ogunyemi (1999), Ngada (2001) and Esomonu (2002). The works of Ezugu (2000) and Garba (2003) showed that in some schools, there were no buildings to house equipment. In others, the buildings were there but in a poor state of repair. Yet in other schools, the equipment was there but it was in short supply and was grossly ill-maintained. Therefore, in order to ascertain whether the situation has improved today, an evaluation exercise is required.

Dogo (1997), Adegun (2001) and Onyejemezi (2001) argued that the dearth of tools, equipment and other forms of instructional materials in our schools is traceable to neglect. Buttressing this point, Oguntuase (1997) said that Nigerian people have a lukewarm attitude towards government property. This non-challant attitude to public infrastructure, according to Isa (2003) has driven Nigerians to indulge in idleness and wasteful celebrations instead of investing in education. Buttressing this point, Dalha (1996) reported that the ill-attitude of Nigerians to government property has led certain schools to leave essential technical equipment to waste away in Hungarian containers, adding that sometimes the tools and equipment which awaited installation suddenly disappeared from the premises of schools. The outcome is that many schools in Nigeria continue to experience the dearth of tools and equipment in workshops. Ultimately, programme implementation in TVE faces a severe threat.

Technical and vocational education (TVE) aims at equipping individuals with knowledge and skills that will make them functional members of the society. However, John and Adeyemi (1999) argued that in technical/vocational education, skills are not just acquired in a vacuum or without facilities, tools, and equipment. John and Adeyemi (1999) stressed that the tools and equipment and other facilities make up the learning environment, conducive for skill acquisition. Effective use of those facilities, according to them, is of paramount importance. Consequently, available tools and equipment must be functional as to be effectively put to use. The non-functioning of tools and equipment in workshops and laboratories of schools in Nigeria explains why many TVE programmes suffer or waste away (Okwelle, 1994; John & Adeyemi, 1999).

Practical lessons are inevitable for most skill training programmes. That is why Eule (2000) argued that students' practical work in our workshops and laboratories demands that the following conditions be met, among others: 1) Adequate facilities 2) Adequate supply of materials and equipment 3) Adequate teaching aids and resources for learning 4) Support facilities for practicing teachers 5) Teachers' confidence in holding practical activity. In many schools in Nigeria however, students lose time in the workshop and are therefore, unable to cover the syllabus that treats the practical aspect of their course (Abubakar, 2000).

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Obafemi (1999) attributed this development to lack of proper planning and arrangement of equipment and materials and the mal-functioning of available equipment and machinery, stressing that sometimes even when tools and equipment are available, they are somewhat underutilized.

Ogbuegbuna-Okwenu (1998) held that the non-use or underutilization of available facilities in our schools is attributable to the teacher, explaining that resource materials in education do not on their own achieve any meaningful values. Their importance depends on what the teacher is able to make of them. Ogbuegbuna-Okwenu (1998:60) stressed that "One of the reasons why available materials are not used by many teachers in schools and colleges is that they lack the necessary skills to operate them." Buttressing this point, Buba (1998) and Aggarwal (2002) argued that the manipulative skill of technical teachers is indispensable in the effective utilization of facilities for implementing programmes in technical/vocational education.

For effective instructional delivery, (Mamman (2000), Aggarwal (2002) and Sampath, Pannelselvan and Santhanam, 2003) are unanimous in their views that technical teachers need to adopt the following methods, among others: selection of facilities in line with behavioural and instructional objectives, presentation in which teachers themselves are familiar with instructional facilities and their use, and physical control in which teachers carefully handle instructional materials such as to guarantee re-use in the next lesson. In fact, instructional facilities have been discovered to be very effective in enhancing students' performance (Alio, 2001; Akpa, 2003). On the other hand, problems relating to availability, adequacy and skills in utilizing workshop and laboratory facilities in our technical schools have led to a decline in students' performances. Most of the schools are unable to meet acceptable standards of performance (Abubakar, 2000; Okoro, 2006). Because there is a close link between students' performances and facilities, the availability, adequacy and level of utilization of facilities for the Electrical Installation and Maintenance Works programme require evaluation as is currently being done in this study.

Yaduma and Moses (2005) undertook a survey of workshop and laboratory facilities in vocational training centres and technical colleges in Bauchi State, Nigeria. Using a descriptive survey design, a structured questionnaire was administered to administrators, teachers and workshop attendants. The study discovered that the schools lacked workshop and laboratory facilities and concluded that students had no practical skills and experience as it was difficult to undertake practical work without the facilities. Muazu (2003) investigated the problems that militated against the effective implementation of technical and vocational programmes in vocational training centres in Adamawa State, Nigeria. The study discovered among others, that the vocational training centres lacked training facilities and this greatly affected students' practical work

MATERIALS AND METHOD

Descriptive survey research design was used for the study. According to Akuezuilo and Agu (2003) a survey research design is one in which a group of people possessing similar characteristics is studied. This involves the collection and analysis of data from only a few of the people considered to be representative of the whole group. The authors added that the sample chosen in a survey research design is normally large while the variables studied are of

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a limited nature. Therefore, the survey research design was appropriate in collecting data that were used to evaluate the facilities of Electrical Installation and Maintenance Works programme of technical colleges in North-East Geo-political Zone of Nigeria. The zone, according to a National Commission on Colleges of Education (NCCE, 2003) publication, is located in far northern part of the former Northern Region of Nigeria. The zone has six States, namely, Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe. Adamawa State lies between latitude 8ºN and 11ºN and latitude 11.5ºE and 13.5ºE. Borno State is in the semi-arid zone of Nigeria. Gombe town and its environs are in the Guinea Savannah land. Taraba State lies between latitude 6º 30″ and 9º 36 ″N and longitude 9º 10″ 11º 50″E. Damaturu, the capital of Yobe State, lies approximately on latitude 11º 14′ N, latitude 11º 58′ N (Abdullahi & Musa, 2004)

The population of the study included principals and the workshop personnel. The workshop personnel, according to Bature (2006) usually include teachers, workshop attendants and students. For this study, part three students were used. The North-East Geo-political Zone had a total of 24 State-owned technical colleges that were running the EIMW programme. From field survey carried out by the researcher, the population of the study was 808, made up of 24 principals, 58 teachers, 18 workshop attendants and 708 students. Using the suggestion by Nworgu (1992) and Nkemakolam (2002), 40% of the population was chosen was the sample of the study, which stood at 398, made up of 10 principals, 26 teachers, 10 workshop attendants and 352 students

The instrument for data collection was a structured questionnaire developed by the researcher, known as Electrical Installation and Maintenance Works Facilities Evaluation Questionnaire (EIMWFEQ). It was divided into two sections, that is, Sections A and B. Section A dealt with the availability of workshop facilities while Section B dealt with the level of utilization of workshop facilities by students during practical lessons. Both sections were treated on a five-point rating scale, as follows:

Very Highly Available (VHA)/Very High Performance (VHP)	=	5 points
Highly Available (HA)/High Performance (HA/HP)	=	4 points
Moderately Available (MA)/Moderate Performance (MP)	=	3 points
Low in Supply (LS)/Low Performance (LP)	=	2 points
Very Low in Supply (VLS)/Very Low Performance (VLP)	=	1 point

The instrument was validated for face and content validity by five experts in Industrial Technology Education drawn from the academia. The experts reviewed "the items in terms of their clarity, the appropriateness of the language and expressions used including the appropriateness of the instructions to the respondents" (Akuezuilo & Agu, 2003:75). The validated instrument was trial-tested, using the test-retest method of estimating reliability, on 2 principals, 6 teachers, 2 workshop attendants and 15 students from two technical colleges outside the study area. There was an intervening period of two weeks between the first test and the second test. At the end of the exercise, the two results were correlated using the Pearson Pearson Product Moment Correlation Coefficient which gave the coefficient of stability of the instrument as 0.94, showing that "the Pearson r is approaching unity, which means that the correlation is very strong linear positive" (Olaitan & Ndomi, 2000:103).

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The instrument was administered by the researcher himself, assisted however, by two research assistants. Five weeks were devoted to the administration of the instrument. Mean ($\bar{x}$) and standard deviation (б) were employed to analyze data for answering the research questions, while the F-ratio (Analysis of Variance, ANOVA) was used to test the null hypotheses at a 0.05 level of significance.

Table 1: True Limits of Real Numbers

Limits	Designation
4.50 – 5.49	VHA/VHP
3.50 – 4.49	HA/HP
2.50 – 3.49	MA/MP
1.50 – 2.49	LS/LP
0.50 - 1.49	VLS/VLP

Table 1 shows the true limits of real numbers. To effect decision, a mean ($\bar{x}$) of 3.50 and above was considered Highly Available/High Performance. Any opinion with a mean between 2.50 and 3.49 was considered moderate, and any opinion with a mean of less than 2.50 was considered low in supply/low performance. The decision rule for the F-ratio was rejecting the null hypothesis, if the calculated F-ratio exceeded the tabulated F-ratio; otherwise the null hypothesis was not rejected (Olaitan & Ndomi, 2000).

RESULTS AND DISCUSSION

The data collected for the study were analyzed using appropriate statistical tools. The research questions were answered using mean and standard deviation while the hypotheses were tested using the analysis of variance.

Research Question 1

To what extent are facilities for EIMW programme available for a minimum class size?

Tables 2 ,3, 4 and 5 present the results of respondents which answered the research question.

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Table 2: Mean and Standard Deviation Scores of Principals, Teachers and Workshop Attendants on the Extent to Which Equipment are Available

S/N	ITEMS	RESPONDENT CATEGORIES							
		Principals		Teachers		Workshop Attendants			
		$N_1 = 10$		$N_2 = 22$		$N_3 = 10$		$\bar{x}_G$	DEC.
		$\bar{x}_1$	$б_1$	$\bar{x}_2$	$б_2$	$\bar{x}_3$	$б_3$		
1.	Work bench	2.70	0.93	2.08	0.91	2.10	0.83	2.23	LS
2.	Crow bar	2.80	1.74	2.96	1.52	2.70	1.32	2.86	MA
3.	Conduit bending machine	2.10	0.92	2.92	1.72	2.90	1.56	2.72	MA
4.	Stock and dies	2.10	0.89	2.28	1.59	2.60	1.37	2.31	LS
5	Clamp	2.90	1.73	2.76	1.63	2.10	0.93	2.64	MA
6	Winding machine	2.50	1.69	2.52	1.83	2.70	1.65	2.56	MA
7	Battery charger	2.80	1.92	3.76	0.99	3.20	0.99	3.39	MA
8	Wiring boards	3.80	0.91	3.72	0.83	3.90	0.82	3.78	H.A
9	Ladder	3.10	0.92	2.72	1.74	3.30	0.89	2.95	MA
10	Blow lamp	2.60	1.42	2.56	1.62	2.30	1.37	2.51	MA
11	Pot and Ladle	3.60	0.95	2.36	1.39	2.50	1.91	2.69	MA
12	Goggle	2.80	1.73	3.08	0.83	3.20	0.92	3.04	MA
13	Soldering iron	3.30	0.93	3.56	0.91	3.10	0.94	3.39	MA
14	Soldering bit	3.50	0.99	3.20	0.95	3.60	0.91	3.37	MA
15	Hand gloves	3.40	0.93	2.72	1.92	3.50	0.87	3.07	MA
16	First aid box	2.20	1.79	2.44	1.22	2.30	1.09	2.35	LS
17	Overalls	2.80	1.78	2.89	1.71	2.90	1.09	2.87	MA
18	Transformers (various)	3.10	0.93	2.92	1.82	3.30	0.96	3.05	MA
19	D.C Motor	2.80	1.82	2.36	1.63	2.60	1.56	2.52	MA
20	A.C. Motor (1-phase)	2.80	1.73	2.44	1.84	3.10	0.93	2.68	MA
21	A.C. Motor (3-phase)	2.50	1.81	2.20	1.61	2.40	1.56	2.32	LS
22	D.C generator	2.40	1.92	2.28	1.75	2.20	1.42	2.29	LS
23	A.C. Generator (1-phase)	2.80	1.39	2.44	1.41	3.20	0.56	2.71	MA
24	A.C Generator (3 Phase)	2.60	1.43	2.08	1.32	2.50	1.72	2.30	LS
25	Starters (Direct on Line)	3.40	0.95	2.84	1.93	3.10	0.92	3.04	MA
26	Circuit breaker	2.90	0.91	3.04	0.93	2.50	0.87	2.87	MA
								2.79	MA

KEY

HA - Highly Available

MA - Moderately Available

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LS - Low in Supply

In Table 2, the mean scores and standard deviations of respondents on the extent of availability of equipment have been presented. In the table, wiring boards is the only item that respondents rated highly available with a grand mean of 3.78. Nineteen items which included conduit bending machine, battery charger, soldering iron, and direct-on-line starter were rated moderately available. Their grand mean scores range from 2.51 to 3.39. Six items were rated low in supply and include work bench, stock and dies, A.C. motor (3-phase) and A.C. generator (3-phase). In the table, the deviations of the scores from the means range from 0.82 to 1.92. The grand mean of all the items in the table is 2.79. This means that equipment for the Electrical Installation and Maintenance Works Programme were moderately available.

Table 3: Mean and Standard Deviations Scores of Principals, Teachers and Workshop Attendants on the Extent to Which Tools are Available

S/N	ITEMS	RESPONDENT CATEGORIES							
		Principals		Teachers		Workshop Attendants			
		$N_1 = 10$		$N_2 = 22$		$N_3 = 10$		$\bar{x}_G$	DEC.
		$\bar{x}_1$	$б_1$	$\bar{x}_2$	$б_2$	$\bar{x}_3$	$б_3$		
1.	Screw driver	3.70	0.90	3.36	1.14	2.40	1.19	3.12	MA
2.	Allen keys	2.00	1.14	3.08	1.35	2.30	1.13	2.64	MA
3.	Hammers	3.40	1.13	3.04	1.17	2.80	1.03	3.07	MA
4.	Pliers	3.20	1.24	2.84	1.03	3.90	1.25	3.18	MA
5	Cutter	3.20	1.19	3.08	1.11	3.50	1.23	3.21	MA
6	Strippers	3.20	0.37	3.36	1.12	3.60	1.03	3.38	MA
7	Mallet	3.40	1.05	2.84	1.07	2.30	1.12	2.84	MA
8	Hack saw	3.50	1.20	3.20	0.99	2.80	1.32	3.18	MA
9	Files	3.00	1.27	3.08	1.09	3.20	1.14	3.09	MA
10	Taps and dies	3.30	1.10	3.03	0.97	3.40	1.32	3.18	MA
11	Drills (Manual)	2.70	1.06	2.08	1.14	2.90	1.19	2.42	LS
12	Drills (Electric)	2.50	1.20	2.08	1.33	2.30	1.09	2.40	LS
13	Reamers	3.30	1.21	3.20	1.02	2.80	1.11	3.13	MA
14	Knives	3.20	1.30	3.08	1.18	3.10	1.27	3.11	MA
15	Raul plug	3.10	0.21	2.96	1.17	3.20	1.35	3.05	MA
16	Gimlet	3.20	1.34	2.84	1.12	3.40	0.93	3.06	MA
								3.01	MA

In Table 3, 14 of the tools were rated moderately available and two were rated low in supply by respondents. The grand mean scores of those rated moderately available range from 2.64 to 3.38 and include Allen keys, screw drivers, strippers and knives, reamers and gimlet. The two tools rated low in supply are electric drill and manual drills. The deviations of the scores from the mean scores range from 0.21 to 1.35. The grand mean score of all the items in the table is 3.01. This result shows that tools for the Electrical Installation and Maintenance Works Programme were moderately available.

Table 4: Mean and Standard Deviation Scores of Principals, Teachers and Workshop Attendants on the Extent to Which Measuring Instruments are Available

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S/N	ITEMS	RESPONDENT CATEGORIES							
		Principals		Teachers		Workshop Attendants			
		$N_1 = 10$		$N_2 = 22$		$N_3 = 10$		$\bar{x}_G$	DEC.
		$\bar{x}_1$	$б_1$	$\bar{x}_2$	$б_2$	$\bar{x}_3$	$б_3$		
1.	A.C ammeters (various ranges)	2.50	1.14	3.08	0.99	3.00	1.01	2.92	MA
2.	D.C Ammeter (various ranges)	2.50	1.56	3.01	0.86	2.90	0.97	2.86	MA
3.	D.C Voltmer (various ranges)	3.10	0.96	2.49	1.71	2.50	1.52	2.64	MA
4.	A.C Voltmeter (various ranges)	2.90	1.54	3.40	1.07	3.30	0.93	3.26	MA
5	Avometer (various ranges)	2.70	1.67	2.70	1.97	2.60	1.51	2.68	MA
6	Energy meter (1-phase)	3.10	0.97	3.40	0.93	2.30	1.91	3.07	MA
7	Energy meter (3-phase)	2.30	1.89	3.32	0.91	2.70	2.01	2.93	MA
8	Mega (insulation tester)	2.70	1.32	3.16	1.04	3.00	1.01	3.01	MA
9	Neon tester	3.00	0.86	2.90	0.99	3.20	0.96	3.00	MA
10	Oscilloscope	2.00	1.03	2.20	1.05	2.10	0.99	2.13	LS
11	Hydrometer	3.20	1.09	2.95	1.37	2.90	1.36	3.00	MA
12	Measuring tape	4.30	0.76	3.12	0.78	3.40	0.97	3.47	MA
13	Signal generator	2.00	1.76	2.05	1.06	2.10	1.87	2.05	LS
14	Rheostat	2.60	1.41	2.49	1.93	3.10	1.04	2.66	MA
15	Bell and battery	2.70	1.53	3.40	0.95	3.20	0.87	3.19	MA
								2.86	MA

Table 4 has a total of 15 items, 13 of which were rated moderately available by respondents. Their grand mean scores range from 2.64 to 3.47. The items include A.C. ammeter, avometer and rheostat and measuring tape. Signal generator and oscilloscope were rated low in supply. The deviations of respondents' scores from the mean scores range from 0.76 to 1.93. The grand mean of all the items in the table is 2.86. This shows that measuring instruments for the Electrical Installation and Maintenance Works Programme were moderately available.

Table 5: Mean and Standard Deviation Scores of Principals, Teachers and Workshop Attendants on the Extent to Which Consumable Materials are Available

S/N	ITEMS	RESPONDENT CATEGORIES							
		Principals		Teachers		Workshop Attendants			
		$N_1 = 10$		$N_2 = 22$		$N_3 = 10$		$\bar{x}_G$	DEC.
		$\bar{x}_1$	$б_1$	$\bar{x}_2$	$б_2$	$\bar{x}_3$	$б_3$		
1.	Ceiling roses	4.40	0.78	4.36	0.74	4.30	0.75	4.36	H.A
2.	Plugs (assorted)	4.20	0.76	3.30	0.98	3.80	0.99	3.63	H.A
3.	Adaptors (assorted)	4.00	0.79	3.10	0.93	4.10	0.85	3.55	H.A
4.	Socket outlet (assorted)	4.10	0.91	3.20	1.06	3.90	0.93	3.58	H.A
5	Switches (assorted)	4.20	0.92	4.10	0.69	3.90	0.93	4.08	H.A

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6	Fuses (assorted)	4.30	0.79	4.10	0.73	3.80	1.01	4.10	H.A
7	Wiring nails	3.60	1.01	3.92	0.81	3.90	0.95	3.84	H.A
								.	
8	Fluorescent fittings	3.50	0.95	3.61	1.62	4.10	0.79	3.70	H.A
9	Clips	3.70	0.87	3.64	1.32	3.50	0.95	3.62	H.A
10	Conduit pipes (Galvanized)	3.60	0.93	3.71	0.97	3.30	0.98	3.58	H.A
11	Conduit pipes (PVC)	3.50	0.97	3.84	0.99	3.70	0.89	3.73	H.A
12	Soldering lead	3.40	0.89	3.96	0.89	3.80	0.91	3.79	H.A
13	Batteries	3.30	0.97	3.41	0.93	3.90	0.96	3.50	H.A
14	Cables	3.90	0.99	3.70	0.95	3.80	0.99	3.77	H.A
15	Sulphuric acid	2.60	1.32	2.97	1.72	2.70	1.81	2.82	MA
16	Distilled water	2.90	1.73	2.87	1.63	2.60	1.62	2.81	MA
17	Installation vanish	2.80	1.81	3.12	0.91	2.90	1.33	2.99	MA
18	Earth rod	3.40	0.96	2.93	1.35	2.80	1.47	3.01	MA
19	Ceramic insulator	3.90	0.94	3.42	0.95	2.90	1.92	3.41	MA
20	Resistors (assorted)	3.70	0.99	3.92	0.90	3.60	0.93	3.79	HA
21	Capacitors (assorted)	4.30	0.76	3.15	0.57	2.90	1.83	3.37	MA
22	Inductors (assorted)	3.40	0.89	3.74	0.99	3.10	0.95	3.51	HA
23	Lamb holders (assorted)	4.20	0.72	3.51	0.92	3.70	0.97	3.72	H.A
								3.57	Mo d.

In Table 5, only seven consumable materials have been rated moderate. Their grand means range from 2.81 to 3.41. The remaining seventeen items have been rated highly available with a maximum grand mean of 4.35. The deviations of respondents' scores from the means range from 0.57 to 1.92. The grand mean of all the items in the table is 3.57. This result indicates that consumable materials for the Electrical Installation and Maintenance Works Programme are highly available.

Research Question 2

What is the level of utilization of facilities by students during practical lessons?

Tables 6, 7, 8 and 9 present the results of respondents on the level of utilization of facilities by students during practical lessons.

Table 6: Mean and Standard Deviation Scores of Teachers, Workshop Attendants and Students on the Level of Utilization of Equipment by Students

S/N	ITEMS	RESPONDENT CATEGORIES							
		Teachers		Workshop Attendants		Students			
		$N_2 = 22$		$N_3 = 10$		$N_4 = 308$		$\bar{x}_G$	DEC.
		$\bar{x}_2$	$б_2$	$\bar{x}_3$	$б_3$	$\bar{x}_4$	$б_4$		
1.	Work bench	2.55	1.45	2.80	1.82	2.59	1.52	2.59	MP
2.	Crow bar	2.59	1.36	20.0	1.79	2.87	1.34	2.83	MP.
3.	Conduit bending machine	2.34	1.92	2.40	1.61	2.35	1.81	2.53	MP
4.	Stock and dies	2.41	1.35	2.30	2.36	2.46	1.93	2.45	LP

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5	Clamp	2.42	1.59	2.70	1.37	3.57	0.98	3.46	MP
6	Winding machine	2.43	1.41	2.10	1.85	2.14	1.45	2.16	LP
7	Battery charger	2.35	1.82	2.40	2.01	2.49	1.71	2.48	LP
8	Wiring boards	3.50	0.98	3.60	0.99	3.45	0.97	3.46	MP
9	Ladder	3.12	0.91	3.40	0.92	3.84	0.76	3.78	HP
10	Blow lamp	2.62	1.62	2.30	1.31	2.13	1.31	2.17	LP
11	Pot and Ladle	2.31	1.61	2.20	1.45	2.35	1.81	2.34	LP
12	Goggle	2.82	1.35	3.10	0.94	3.51	0.83	3.45	MP
13	Soldering iron	2.62	1.63	3.60	0.96	2.96	1.71	2.96	MP
14	Soldering bit	2.74	1.82	3.30	0.98	2.48	1.43	2.61	MP
15	Hand gloves	2.71	1.36	2.90	1.81	2.85	1.73	2.84	MP
16	First aid box	2.69	1.47	3.20	0.99	3.5	0.99	3.44	MP
17	Overalls	3.81	0.78	3.20	0.92	3.73	0.74	3.68	HP
18	Transformers (various types)	2.31	1.32	2.30	1.35	2.12	1.32	2.34	LP
19	D.C Motor	2.43	1.53	2.30	1.49	2.32	1.41	2.17	LP
20	A.C. Motor (1- phase)	2.34	2.02	2.50	1.38	2.41	1.35	2.41	LP
21	A.C. Motor (3-phase)	2.29	1.62	2.60	1.82	2.33	1.46	2.33	LP
22	D.C generator	2.41	1.95	2.30	1.73	2.42	1.71	2.42	LP
23	A.C. Generator (1-phase)	2.53	1.36	2.60	1.39	2.31	1.82	2.33	LP
24	A.C Generator (3 Phase)	2.41	1.53	2.20	1.41	2.31	1.93	2.31	LP
25	Starters	3.61	0.97	2.90	1.91	2.58	1.64	2.66	MP.
26	Circuit breaker	2.5	0.97	3.30	0.97	2.40	1.21	2.43	LP.
								2.67	MP.

In Table 6, students' level of utilization of equipment is moderate in 11 items. They include items 1, 3, 13, 16 and 25. Their grand means range from 2.53 to 3.44. Thirteen items showed that students had a low performance in them. They included items 6, 7, 11, 18, 20, 21, and 26. In two of the items, namely 9 and 17, students' performance in them was high. The grand mean of all the items on the table is 2.67. This shows that students' level of utilization of equipment during practical lessons is of moderate performance.

Table 7; Mean and Standard Deviation of Scores of Teachers, Workshop Attendants and Students on the Level of Utilization of Tools by Students

S/N	ITEMS	RESPONDENT CATEGORIES							
		Teachers		Workshop Attendants		Students			
		$N_2 = 22$		$N_3 = 10$		$N_4 = 308$		$\bar{x}_G$	DEC.
		$\bar{x}_2$	$б_2$	$\bar{x}_3$	$б_3$	$\bar{x}_4$	$б_4$		
1.	Screw driver	3.15	0.95	2.70	1.81	2.95	1.92	2.96	MP
2.	Allen keys	2.22	1.32	2.20	1.63	2.36	1.35	2.35	LP
3.	Hammers	3.16	0.89	2.80	1.34	2.71	1.43	2.74	MP
4.	Pliers	3.51	0.91	3.40	0.97	3.12	0.95	3.15	MP
5	Cutter	3.72	0.78	3.10	0.93	3.20	0.99	3.23	MP
6	Strippers	3.10	0.92	2.90	1.54	2.95	1.82	2.96	MP
7	Mallet	2.91	1.63	2.90	1.63	3.32	0.91	3.28	MP

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8	Hack saw	3.01	0.95	3.20	0.90	3.53	0.90	3.54	HP
9	Files	3.42	0.92	3.30	0.93	3.59	0.83	3.57	HP
10	Tap and dies	2.15	1.52	2.10	1.05	2.31	1.39	2.29	LP
11	Drills (manual)	2.35	1.42	2.30	1.32	2.2	1.33	2.21	LP
12	Drills (electric)	2.31	1.71	2.40	1.25	2.41	1.83	2.40	LP
13	Reamers	2.51	1.82	2.50	1.43	2.32	1.74	2.31	LP
14	Knives	3.10	0.93	3.40	0.96	3.41	0.97	3.39	MP
15	Raul plug	2.71	1.34	2.90	1.34	3.01	0.99	3.10	MP
16	Gimlet	2.95	1.93	3.20	0.93	3.12	0.93	3.11	MP
								3.06	MP

In Table 7, the level of utilization of tools by students is of moderate performance in nine items which include items 3, 6, 7, 14 and 16. In two items a high performance has been recorded. They are items 8 and 9. A low performance was recorded in five items which included items 2, 10 and 13. The grand mean of all the items on the table is 3.06. This shows that the level of utilization of tools by students during practical lessons is of moderate performance.

Table 8: Mean and Standard Deviation Scores of Teachers, Workshop Attendants and Students on Students' Level of Utilization of Measuring Instruments

S/N	ITEMS	RESPONDENT CATEGORIES							
		Teachers		Workshop Attendants		Students			
		$N_2 = 22$		$N_3 = 10$		$N_4 = 308$		$\bar{x}_G$	DEC.
		$\bar{x}_2$	$б_2$	$\bar{x}_3$	б	$\bar{x}_4$	$б_4$		
1.	A.C. ammeters (various)	2.51	1.62	2.40	1.72	2.31	1.79	2.31	LP
2.	D.C. ammeter	2.36	1.54	2.30	1.58	2.4	2.14	2.39	LP
3.	D.C. voltmeter	2.27	1.81	2.40	1.34	2.35	1.81	2.34	LP
4.	A.C. voltmeter	2.31	1.78	2.30	1.82	2.27	1.37	2.27	LP
5	Avometer	2.42	1.62	2.20	1.91	2.51	1.45	2.50	MP
6	Energy meter (1-phase)	2.31	1.83	2.30	1.69	2.51	1.71	2.49	LP
7	Energy meter (3-phase)	2.43	2.01	2.40	1.36	2.21	1.33	2.22	LP
8	Megger (insulation tester)	2.32	1.92	2.20	1.84	2.41	1.25	2.39	LP
9	Neon tester	2.4	1.05	2.10	1.71	2.36	1.82	2.35	LP
10	Oscilloscope	2.4	1.64	2.70	1.53	2.37	1.93	2.38	LP
11	Hydrometer	2.17	1.53	2.40	1.41	2.13	1.73	2.14	LP
12	Measuring tape	3.21	0.97	3.80	0.72	3.25	0.93	3.26	MP
13	Signal generator	2.31	1.81	2.50	1.38	2.51	1.92	2.49	LP
14	Rheostat	3.31	0.92	2.90	1.52	3.51	1.91	3.48	MP
15	Bell and battery set	3.43	0.78	3.10	0.92	3.49	0.95	3.47	MP
								2.57	MP

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In Table 8, students recorded a low performance in 11 items among which are items 1, 4, 7, 10, and 13. In four items, students' level of performance is moderate. They items are 5, 12, 14 and 15. The grand mean of all the items on the table is 2.57. This result indicates that there is moderate performance by students on measuring instruments during practical lessons.

Table 9: Mean and Standard Deviation Scores of Teachers, Workshop Attendants and Students on Students' Level of Utilization of Consumable Materials

S/N	ITEMS	RESPONDENT CATEGORIES							
		Teachers		Workshop Attendants		Students			
		$N_2 = 2$		$N_3 = 10$		$N_4 = 308$		$\bar{x}_G$	DEC.
		$\bar{x}_2$	$б_2$	$б_3$		$\bar{x}_4$	$б_4$		
1.	Ceiling roses	3.20	0.91	2.90	1.81	3.10	0.91	2.59	MP
2.	Plugs (assorted)	2.40	1.35	3.40	1.32	3.19	1.34	2.83	MP
3.	Adaptors (assorted)	2.80	1.61	3.20	1.31	2.45	1.49	2.53	MP
4.	Socket outlet (assorted)	2.95	1.73	3.40	1.21	2.37	1.23	2.45	LP
5	Switches (assorted)	3.20	0.95	3.20	0.93	3.10	0.93	3.46	MP
6	Fuses (assorted)	3.00	0.91	3.50	0.98	3.60	0.79	2.16	LP
7	Wiring nails	3.30	0.97	3.30	0.79	3.70	0.96	2.48	LP
8	Fluorescent fittings	3.20	0.92	3.90	0.74	3.40	0.99	3.46	MP
9	Clips	3.60	0.99	3.40	0.73	3.20	0.76	3.78	HP.
10	Conduit pipes (galvanized)	2.70	1.45	2.30	1.23	2.50	1.32	2.17	LP
11	Conduit pipes (PVC)	2.50	1.71	3.10	0.96	3.70	0.85	2.34	LP.
12	Soldering lead	2.70	1.82	3.40	0.99	3.10	0.92	3.45	MP
13	Batteries	2.50	1.32	2.10	1.36	2.40	1.36	2.96	MP
14	Cables	3.40	1.41	2.60	1.46	3.50	1.45	2.61	MP
15	Sulphuric acid	2.50	1.43	2.40	1.71	2.40	1.32	2.84	MP
16	Distilled water	2.40	1.22	2.30	1.82	2.50	1.45	3.44	MP
17	Installation	2.20	1.45	2.40	1.36	2.20	1.52	3.68	HP
18	Earth rod	2.30	1.72	2.70	1.81	2.60	1.21	2.34	LP
19	Ceramic insulator	2.52	1.82	2.50	1.75	2.72	1.53	2.17	LP
20	Resistors (assorted)	2.40	1.42	2.30	1.71	2.50	1.61	2.41	LP
21	Capacitors (assorted)	2.50	1.53	2.30	1.82	2.10	1.72	2.33	LP
22	Inductors (assorted)	3.60	0.96	3.20	0.97	3.50	0.91	2.42	LP
23	Lamp holders (assorted)	3.20	0.92	3.50	0.79	3.00	0.92	2.33	LP
								2.89	MP

In Table 9, students' level utilization of consumable materials is high in two items, namely 9 and 11. Moderate performance was recorded in 10 ten items among which are items 1, 3, 8, 11, 12 and 16. In 11 items, students' performance in the consumable items was low. The items included 6, 10, 18 and 23. The grand mean of all the items on the table is 2.89. This result shows that the level of utilization of consumable materials by students during practical lessons is moderate.

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Hypothesis 1

There is no significant difference in the mean responses of principals, teachers and workshop attendants on the extent to which facilities are available for a minimum class size.

Data that tested this hypothesis are presented in Table 10.

Table 10: Analysis of Variance (ANOVA) Test for Comparing the Mean Scores of Principals, Teachers and Workshop Attendants on the Extent to Which Facilities are Available

Sources of Variation	df	Sum of Squares	Mean Squares	F-cal	F-critical	Significance	Decision
Between Means	2	0.02	0.08	0.24	4.26	NS	Uphold
Within Means	9	2.75	0.31				
TOTAL	11	2.77					

Table 10 presents the result that was obtained when hypothesis 1 was tested at degrees of freedom (df) 2 and 9 and 0.05 level of significance. From the table, the calculated F value (F-cal) of 0.24 is less than the tabulated value (F-tab) of 4.26. This result shows that there is no significant difference in the mean responses of principals, teachers and workshop attendants on the extent to which facilities are available for a minimum class size. Therefore, the null hypothesis, Ho_2, is upheld.

Hypothesis 2

There is no significant difference in the mean scores of teachers, workshop attendants and students on the level of utilization of facilities by students during practical lessons.

This hypothesis was tested by the data in Table 11.

Table 11: Analysis of Variance Test for Comparing the Mean Scores of Teachers, Workshop Attendants and Students on the Level of Utilization of Facilities During Practical Lessons

Sources of Variation	df	Sum of Squares	Mean Squares	F-cal	F-critical	Significance	Decision
Between Means	2	0.06	0.030	1.11	4.26		N S Uphold
Within Means	9	0.24	0.027				
TOTAL	11	0.30					

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In Table 11, at 0.05 level of significance, the critical value of F at 2 and 9 degrees of freedom is 4.26. The calculated value of F is 1.11. This value is less than the critical value. The null hypothesis, Ho_5, is upheld. Therefore, teachers, workshop attendants and students do not differ significantly in their mean scores on the level of utilization of facilities by students during practical lessons.

Findings of the Study

Based on the analysis of the results, the following constituted the major findings of the study:

1. Equipment, tools and measuring instruments were moderately available. They included conduit bending machine, battery charger, direct-on-line starter, Allen keys, A.C. meters, rheostat, installation varnish and capacitors.

2. Consumable materials were highly available. They included ceiling roses, cables wiring nails and resistors.

3. Students' level of utilization of equipment, tools and consumable materials during practical lessons was of moderate performance..

4. Students' level of utilization of measuring instruments during practical lessons was low in 12 out of 15 measuring instruments. On the whole, students' level of utilization of measuring instruments during practical lessons was of low performance.

5. A significant difference did not exist, at the chosen probability level, in the mean responses of principals, teachers and workshop attendants on the extent to which facilities for the Electrical Installation and Maintenance Works Programme were available

6. At a 0.05 level of significance, there was no significant difference in the mean responses of teachers, workshop attendants and students on the level of utilization of consumable materials by students during practical lessons.

DISCUSSION OF THE FINDINGS

The study found that some tools and equipment such as D.C. and A.C. generator were low in supply. This finding was supported by the work of Sa'ad (2001) who found that in many schools in the North-East Geo-political Zone of Nigeria, tools, equipment, classrooms and laboratories were grossly supplied. Consequently, Onyejemezi (2001) concluded that many schools in Nigeria experience the non-availability of educational facilities. The finding of this study is further supported by the work of Yaduma and Moses (2005) who found that electrical workshop facilities in Vocational Centres and Technical Colleges in Bauchi State were low in supply. On the whole however, the study found that facilities for the programme of Electrical Installation and Maintenance Works in technical colleges in the North-East Geo-political Zone were moderately available. This finding was supported by the work of Omozokpia (2001) who found that electricity, water, lecture rooms, offices and workshops for production work in technical colleges in northern Nigeria were moderately available. This finding is further supported by Fagbemi (1997), Ngada (2001), Esomonu (2002) and Garba (2003) who found in their separate works that facilities for many TVE programmes in Nigeria were only moderately available.

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The study found that facilities such as conduit bending machine, battery charger, D.C. and A.C. generators and oscilloscopes were underutilized by students during practical lessons. This finding was supported by the work of Mohammed (1992) who found that there was generally an underutilization of facilities by schools in Sokoto state. On the whole, the finding of this study in which students' level of utilization of workshop facilities is not high is supported by the work of Mukhtar and Abdullahi (2005) who found that students' level of exposure to workshop and laboratory materials was not high and this was hampering their performances. Buttressing this point, Omozokpia (2001) identified inadequate supply of facilities as a factor that inhibited production work in engineering trades cluster of technical colleges in Northern Nigeria. Consequently, John and Adeyemi (1999) argued that without effective use of workshop facilities by students during practical lessons, the needed skills will never be acquired. However, Cronbach in Fritz, Stewart and Norwood (2002) believed that performances of students in such practical lessons will improve as experiences of students become consistent. Fritz, Stewart and Norwood (2002) added that to bridge cognition and students' personality in workshop practical work, an insight into students' unique learning needs must be gained. In Table 23, the analysis of variance test revealed that a significant difference did not exist in the mean scores of teachers, workshop attendants and students on the level of utilization of facilities by students during practical lessons. This shows that in contrast to the work of Ebenehi (2006), background, training and experience of the respondents were not significant factors in their opinions.

The mean scores of principals, teachers and workshop attendants did not differ on the extent to which facilities for the programme of Electrical Installation and Maintenance Works were available. That was why the null hypothesis, Ho_2, was upheld. This finding indicates that teachers and workshop attendants are unanimous in their views that on the whole, facilities for the Programme are moderately available. The finding is in line with the finding of Fagbemi (1997) who discovered that a significant difference did not exist in the opinions of teachers and students on the availability of workshop facilities. The finding is further supported by the works of Eremie and Ekpere (2008) and Nwosu (1998) which found that there was moderate number of resources for the teaching of Chemistry in schools.

CONCLUSION

The findings of this study form the basis for drawing the following conclusions: First, facilities for Electrical Installation and Maintenance Works Programme in technical colleges in the North-East have fallen short of the requirement for running the programme. Secondly, students' poor performances in the Electrical Installation trade could be attributed to the lack of adequate supply of facilities in the institutions. Thirdly, because students perform poorly in national examinations, they lack the skills and knowledge that will make them gainfully self-employed. Fourthly, if no urgent step is taken to improve facilities supply in the institutions, then the performances of students in national examinations will worsen. Consequently, without the necessary skills and knowledge, more of them will remain unemployed. Therefore, the study made the following recommendations:

1. Industries sited in communities where technical colleges are located should be made to contribute funds that will be used in he procurement of tools and equipment.

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2. Technical colleges should be encouraged and assisted to undertake fund raising activities (appeal fund launchings), the funds of which should be judiciously used to procure tools and equipment for the workshops of the technical colleges.

3. Instead of setting up new technical colleges which is capital intensive, government needs to fund and equip existing technical colleges. This way, the standard of the technical colleges will improve greatly.

The findings of the study did have serious implications for government, the community, teachers and students. The current state of facilities in the technical colleges, if left unchecked, is likely to render many technical and vocational education (TVE) programmes ineffective. The fact that facilities for the programme of Electrical Installation and Maintenance Works have fallen short of the require and d standard poses a serious challenge for the government and people of the North-East. If the situation is left to continue, the performance of teachers in implementing the programme will be low. This will undoubtedly continue to negatively affect students' performances. In the end, objectives of TVE to train individuals to be self-reliant and enterprising will be difficult to achieve. This will imply that a lot more Nigerians will remain unemployed and social vices like armed robbery, drug abuse and prostitution will increase.

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