
Adequacy and Utilization of Instructional Materials for Teaching Electrical Installation and Maintenance Work Trade in Adamawa State Technical Colleges

By

Mohammed Bashir

Department of Electrical Technology Education
Modibbo Adama University of Technology P.M.B 2076, Yola
Adamawa State; Nigeria
Email; mohammedbashir2016@mautech.edu.ng

ABSTRACT

This study assessed the Adequacy and Utilization of Instructional equipment and materials in Adamawa State Technical Colleges. Two research questions and a null hypothesis guided the study. Descriptive survey design was adopted for the study. The population for the study consisted of 320 NTC II students of the Technical Colleges in Adamawa State offering Electrical Installation and Maintenance Work Trade and 13 teachers. Data was collected through a 20 items structured questionnaire titled "Assessment of Instructional equipment and materials Questionnaire" (AIEMQ). Mean and standard deviation were used to answer the research questions while the hypothesis was tested at 0.5 level of significance using z-test. Findings of the study revealed that there is inadequate Instructional equipment and materials for teaching Electrical Installation and Maintenance Work Trade in the technical Colleges and those available are not utilized. Recommendations based on the findings are made among which is teachers of Electrical Installation and Maintenance Work Trade should be encouraged to improvise Instructional equipment and materials for teaching. This could be achieved by way of organizing workshops and seminar to build teachers' capacity.

Keywords: Adequacy, Utilization, Instructional Equipment and Materials, Electrical Installation and Maintenance Work Trade, Technical Colleges

INTRODUCTION

Technical Education is an aspect of education that deals with the training, acquisition and utilization of skills and techniques in a chosen occupation or profession to enable an individual earn a living. It is essential for the technological and economic development of any country. According to Uwaifo (2009) Technical Education provides various avenues for discovering and developing the individual's potential for work. It broadens effects which motivates learners to be exploratory, realize their capabilities and develop their potentials for success in the world of work.

Technical education has more direct impact on national welfare hence its contributions are widespread and visible ranging from metalwork technology, mechanical/automobile technology, electrical and electronic technology, building and woodwork technology etc. Uwaifo (2010) further opined that, Technical education can serve as change agents not only for technical systems but also for many other societal changes. The practical nature of technical education makes it unique in content and approach, thereby requiring special care and attention. Uwaifo observed that the inputs

of Technical education are so visible to the extent that even an illiterate could see when 'failures' occur. Technical education aimed at preparing technologists/technicians to solve societal problems in sustainable ways.

However, for them to do so, they need to be sufficiently informed in technical education concepts and application of its theoretical principles to practical problems. Uwaifo also lamented that the desire of stakeholders for students of technical colleges to receive quality training and acquisition of practical and applied skills has been met by lots of challenges. The inability to tackle these challenges over the years in Nigeria has contributed to the low level of technological incubations and has perpetually made Nigeria a developing nation (Uwaifo, 2010). Consequently, the difference between developed, developing and undeveloped countries is the ability to convert scientific ideas to useable technology.

Electrical Installation and Maintenance Work (EIMW) is a trade among the Electrical Engineering Trade programmes offered in Technical Colleges in Nigeria. The trade is aimed at preparing students with necessary knowledge and skills in electrical works to earn a living. EIMW trade as a technical occupation requires both knowledge and skill acquisition hence teachers of EIMW trade should be able to effectively pass much of the work skills to learners. Electrical Installation and Maintenance Work trade as offered in technical colleges has three modules. These are: Domestic and Industrial Installations; Cable jointing, Battery charging and Repair; and Winding of electrical machine (National Business and Technical Examination Board (NABTEB), 2006). According to NABTEB,

Domestic and Industrial Installations module will provide students with knowledge and skills to enable them complete electrical installation in a residential building as well as ability to interpret electrical wiring drawing of factories and complete simple surface and conduit wiring for industrial electrical installation.

The cable jointing, battery charging and repair module is aimed at exposing students to techniques of cable jointing at different stages of installation work. Basic and advanced procedures for battery charging as well as steps involved in trouble shooting and repairs is also provided. Winding of electrical machines on the other hand is aimed at acquainting students of technical college with the required knowledge and skills to enable them wind and rewind AC and DC rotation/static machines of up to 10KVA. The module also exposes students to IEE regulation requirements during electrical winding work (National Board for Technical Education (NBTE), 2011).

However, Umunadi (2009) opined that, to realize the objectives of technical colleges' Electrical Engineering programme and improve students' performance in Electrical Installation and Maintenance Work trade, factors such as adequacy of instructional equipment and materials, proper implementation and usage of instructional equipment and material must be addressed. Similarly, Awobodu (2000) also observed that utilization of relevant instructional equipment, materials and tools in teaching Electrical Installation and Maintenance Work trade facilitates learning and enhances students' academic performance.

Umunadi (2009) also acknowledges that, effective utilization of Instructional equipment and materials will help teachers

to subsequently impart knowledge effectively during the course of implementation of the curriculum. In the light of the forgoing, how adequate is the available instructional equipment and materials and its level of utilization are questions that raises concern to the researcher hence the study was developed to assess the adequacy and utilization of instructional equipment and materials for teaching Electrical Installation and Maintenance Work trade in Technical Colleges in Adamawa State.

Research Questions

1. What is the level of adequacy of instructional equipment and materials for teaching Electrical Installation and Maintenance Work Trade in Adamawa State technical colleges?
2. What is the level of utilization of instructional equipment and materials Electrical Installation and Maintenance Work Trade in Adamawa State technical colleges?

Hypothesis

Ho: There is no significant difference in the mean responses of teachers and students of Adamawa State Technical colleges on the utilization of instructional equipment and materials for Electrical Installation and Maintenance Work Trade.

METHODOLOGY

The study employed a descriptive survey design and was carried out in Adamawa State. The population for the study comprised of 320 NTC II students

and 13 teachers of Electrical Installation and Maintenance Work Trade from the three Technical Colleges of Adamawa State. There was no sample for this study hence no sampling technique was adopted. Data collected for this study was through structured questionnaire titled "Assessment of Instructional Equipment and Material Questionnaire" –AIEMQ. The questionnaire consisted of two sections. Section I dealt with items relating to the adequacy of instructional equipment and materials while section II dealt with utilization of the instructional equipment and materials. These items are equipment and materials necessary for the effective teaching of Electrical Installation and Maintenance Work Trade as recommended by NBTE (2011) in the curriculum and course specifications for technical College programmes.

In section I, respondents answered questions on a modified five-point Likert-type scale of Not Adequate, Barely Adequate, Moderately Adequate, Highly Adequate and Very Highly Adequate. For questions on the utilization of Instructional equipment and materials (section II), a similar five-point Likert-type scale of Not Used, Barely Used, Moderately Used, Highly Used and Very Highly Used representing values of 5, 4, 3, 2 and 1 respectively was employed. The decision that an item is Adequate or Not Adequate, Utilized or Not Utilized as the case may be was taken on the mean of 3.00. Mean and standard deviation were used to answer the research questions. The hypothesis that guided the study was tested using Z-test at 0.05 α level of significance.

Table 1: Distribution of Electrical Installation and Maintenance Work Trade Teachers and Students of Technical Colleges in Adamawa State

S/n	College	Teachers	Students
	Total		
1	GSTC, Yola	5	121
2	GSTC, Numan	4	103
3	GSTC, Mubi	4	96
	Total	13	320

Source: Adamawa State Ministry of Education Headquarters, Yola and Field Study (2017)

RESULTS

Research Question 1: What is the level of adequacy of instructional equipment and

materials for teaching Electrical Installation and Maintenance Work Trade in Adamawa State technical colleges?

Table 2: Mean and Standard Deviation of responses on Adequacy of Instructional equipment and materials

S/N	Item Description	X_T	SD_T	Remarks	X_S	SD_S	Remarks
1.	Alternator	0.99	0.89	Not Adequate	1.12	1.02	Not Adequate
2	Ammeter 0-5A (AC &DC)	1.00	0.86	Not Adequate	1.02	1.49	Not Adequate
3	Digital clock	0.98	1.73	Not Adequate	1.18	1.75	Not Adequate
4	Electromagnet	1.00	1.65	Not Adequate	1.00	1.23	Not Adequate
5	Inductors	1.02	1.71	Not Adequate	0.80	0.84	Not Adequate
6	Voltmeter 100V (ac & dc)	1.00	1.77	Not Adequate	1.00	1.19	Not Adequate
7	Digital Multi-meter	1.00	1.43	Not Adequate	1.00	1.07	Not Adequate
8	Earth Rod	0.80	1.06	Not Adequate	1.00	1.71	Not Adequate
9	Transistors, IC	1.00	1.78	Not Adequate	1.00	2.24	Not Adequate
10	Ebonite Rode	1.00	1.85	Not Adequate	1.00	2.05	Not Adequate
11	Batteries (Dry & Wet cell)	1.00	1.72	Not Adequate	1.00	1.73	Not Adequate
12	Iron Fillings	1.00	1.72	Not Adequate	1.00	1.21	Not Adequate
13	Galvanometer	1.00	1.36	Not Adequate	1.00	1.21	Not Adequate
14	Res; Cap; Tformers	0.82	1.06	Not Adequate	1.00	2.11	Not Adequate
15	Switches, One-Way Toggle	0.80	1.39	Not Adequate	1.00	2.05	Not Adequate
16	Ohmmeter	1.00	2.18	Not Adequate	1.00	1.57	Not Adequate
17	Generator 1.5KVA	1.00	2.16	Not Adequate	1.00	1.38	Not Adequate
18	Digital Millimeter	1.02	2.04	Not Adequate	1.00	2.23	Not Adequate
19	Oscilloscope	1.00	1.79	Not Adequate	1.00	1.72	Not Adequate
20	Soldering Iron & Lead	1.00	1.77	Not Adequate	1.00	1.74	Not Adequate
	Grand Mean	0.97		Not Adequate		1.01	Not Adequate

KEY

X_T = Teachers' mean responses; SD = Standard Deviation; X_S = Students' mean responses

In table 2 above, all of the items are rated below 3.00 and the grand means are equally below 3.00. This implied that the

available Instructional Equipment and Materials are not adequate for teaching Electrical Installation and Maintenance

Work Trade. The various standard deviations also indicate opinions not far from the mean responses.

Research Question 2: What is the level of utilization of instructional equipment and materials for teaching Electrical Installation and Maintenance Work Trade in Adamawa State technical colleges?

Table 3: Mean and Standard Deviation of responses on level of utilization of Instructional equipment and materials

S/N	Item Description	X_T	SD_T	Remarks	X_S	SD_S	Remarks
1	Alternator	2.33	0.71	Not utilized	1.84	0.53	Not utilized
2	Ammeter 0-5A (ac & dc)	1.78	0.83	Not utilized	1.57	0.64	Not utilized
3	Digital clock	2.22	0.83	Not utilized	1.63	0.72	Not utilized
4	Electromagnet	2.22	0.83	Not utilized	1.31	0.63	Not utilized
5	Inductors	1.78	0.83	Not utilized	1.21	0.48	Not utilized
6	Voltmeter 100V (ac & dc)	1.33	0.71	Not utilized	1.38	0.54	Not utilized
7	Digital Multi-Meter	1.22	0.67	Not utilized	1.21	0.45	Not utilized
8	Earth Rod	1.78	0.97	Not utilized	1.67	0.45	Not utilized
9	Transistors, IC	1.78	0.97	Not utilized	1.96	0.71	Not utilized
10	Ebonite Rode	1.00	0.00	Not utilized	1.14	0.45	Not utilized
11	Batteries (Dry & Wet cell)	1.00	0.00	Not utilized	1.16	0.45	Not utilized
12	Iron Fillings	1.00	0.00	Not utilized	1.14	0.43	Not utilized
13	Galvanometer	1.00	0.00	Not utilized	1.54	0.84	Not utilized
14	Res; Cap; Transformers	2.51	0.67	Not utilized	2.50	0.64	Not utilized
15	Switches, One-Way Toggle	1.89	0.93	Not utilized	2.19	0.80	Not utilized
16	Ohmmeter	1.00	0.00	Not utilized	1.06	0.34	Not utilized
17	Generator 1.5KVA	1.00	0.00	Not utilized	1.03	0.24	Not utilized
18	Digital Millimeter	1.00	1.99	Not utilized	0.80	0.93	Not utilized
19	Oscilloscope	1.44	0.73	Not utilized	1.48	0.57	Not utilized
20	Soldering Iron & Lead	1.56	0.73	Not utilized	1.75	0.55	Not utilized
	Grand Mean	1.62		Not utilized	1.47		Not utilized

KEY

X_T = Teachers' mean responses; SD = Standard Deviation; X_S = Students' mean responses

From table 3, all items are rated below 3.00. This means that the items are not utilized for teaching Electrical Installation and Maintenance Work Trade. Consequently, the grand means of 1.62 and

1.47 indicates that Instructional Equipment and Materials are not utilized for teaching Electrical Installation and Maintenance Work Trade.

Table 4: Z-test of difference in responses between teachers and students of Electrical Installation and Maintenance Work Trade

Group	N	Mean	SD	SE	Z-Cal	Z-Crit
Teachers	13	1.57	0.49	0.11	0.17	±1.96
Students	320	1.53	0.40	0.08		

Table 4 above presents the z-test result of the hypothesis that guided the study. The z-calculated was 0.17 while the z-critical is ± 1.96 . The test revealed a no significant difference between the mean responses of teachers and students of Electrical Installation and Maintenance Work Trade on the utilization of Instructional Equipment and Materials for teaching. Consequently, the null hypothesis was upheld

FINDINGS OF THE STUDY

The findings of the study are presented based on the research questions and hypothesis that guided the study.

1. Instructional Equipment and Materials are not adequate for teaching Electrical Installation and Maintenance Work Trade in Adamawa State technical colleges
2. Instructional Equipment and Materials are not utilized for teaching Electrical Installation and Maintenance Work Trade in Adamawa State technical colleges
3. Significant difference does not exist between the mean responses of teachers and students of Electrical Installation and Maintenance Work Trade on the utilization of Instructional Equipment and Materials for teaching.

DISCUSSIONS OF FINDINGS

The findings of the study relating to research question one revealed that there was no adequate instructional equipment and materials for teaching Electrical Installation and Maintenance Work Trade in the technical colleges. With the overall grand means of 0.97 and 1.01, it is concluded that technical colleges had inadequate instructional equipment and materials. This was a confirmation of an

earlier revelation by Olumese (2004) and Aneale (2005) who revealed that students in technical colleges are not well exposed to practical works due to lack/inadequate equipment and consumable materials for teaching Electrical Installation and Maintenance Work Trade and that this certainly affects them in their examinations. The implication of this trend is that most students who graduated from these technical colleges are not properly trained.

Findings of the study on the utilization of instructional equipment and materials revealed teachers and students' grand means of 1.62 and 1.47 respectively implying that instructional equipment and materials are not utilized in teaching Electrical Installation and Maintenance Work Trade. This is in conformity with an earlier submission by Umunadi (2009) who posited that instruction equipment and materials in technical colleges are not utilized and that this under-utilization is a serious problem that affects students' performance and ability to function, succeed and contribute to economic advancement once they leave college.

Z-test analysis of the null hypothesis of no difference between the mean responses of teachers and students of Adamawa State technical colleges on the utilization of instructional equipment and materials for teaching Electrical Installation and Maintenance Work Trade revealed that no significant difference existed between the opinion of the two groups (teachers and students). This is because both the teachers and students opined that they barely utilized instructional equipment and materials during Electrical Installation and Maintenance Work Trade lessons.

CONCLUSION AND RECOMMENDATIONS

The study assessed the level of adequacy of Instructional equipment and materials and its utilization in teaching Electrical Installation and Maintenance Work Trade in Adamawa State Technical Colleges. The study revealed that there is inadequate Instructional equipment and materials in the technical colleges and that it is consequently not been utilized in teaching Electrical Installation and Maintenance Work Trade. Teachers and students conclusively opined that they do not utilize Instructional equipment and materials in teaching processes and their opinion do not differ. Based on the findings of this study the following recommendations are suggested:

1. Provision should be made for adequate supply of Instructional equipment and materials to the Technical Colleges for teaching Electrical Installation and Maintenance Work Trade.
2. Teachers of Electrical Installation and Maintenance Work Trade should be encouraged on improvisation of Instructional equipment and materials for teaching.
3. Teachers of Electrical Installation and Maintenance Work Trade should be engaged on capacity building to enable them utilize Instructional equipment and materials for teaching whenever it is provided/improvised.

REFERENCES

- Aneale, E (2005) "Electrical/Electronic skills needed by technical college students for self-employment": *Journal of Vocational and Adult Education* 4 (1) 27-35
- Awobodu, V. Y (2000) "Materials resources utilization for teaching primary science in the era of universal Basic education in A. W. Ajetunmobi, F. O. Ezeudu; O. M. Adesope; G. D. Momoh (Eds) Technology education and the universal Basic education in Nigeria" *Nigerian Association of Teachers of Technology* Lagos: Alographiks kommunikations company pp. 204-207.
- NABTEB (2006) "National Board for Technical Education Modular Curriculum for Electrical Engineering Trades": Benin City; Nigeria
- NBTE (2011) "Curriculum and Course Specification for National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC)" Programmes: Retrieved May 16, 2014 from <http://www.nbte.org/programmes/curr/pdf>
- Olumese, H. A. (2004) "Vocational and Technical Education in Nigeria; Issue and Prospect": *Nigerian Journal of Communication Studies* 11 (1) 73-77
- Uwaifo, V. O (2009) "Industrializing the Nigerian Society through Creative Skills Acquisition in Vocational and Technical Education Programme": Retrieved May 16, 2014 from <http://www.academicjournals.org/NGO/PDF/2009/uwaifo>
- Uwaifo, V. O (2010) "Technical Education and its Challenges in Nigeria in the 21st Century": Retrieved May 16, 2014 from <http://www.academicjournals.org/NGO/PDF/2010/uwaifo>
- Umunadi, K. E (2009) "Teachers Utilization of Instruction Equipment and

Materials in teaching Basic
Electricity in Urban and Rural
technical colleges”: Retrieved
February 24, 2015 from
<http://www.ij sre.com>