



CONSTRAINTS TO REPAIRS AND MAINTENANCE OF ELECTRONIC SYSTEMS IN TECHNICAL COLLEGES' WORKSHOPS IN RIVERS STATE OF NIGERIA

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Abstract:

The study investigated constraints to repairs and maintenances of electronic systems in technical colleges' workshops in Rivers State. The study adopted the survey research design. The population of the study was 342 persons comprised of 309 students and 33 teachers from the five technical colleges in Rivers State. A simple random sampling technique was used to obtain a sample size of 188 which comprises of 33 teachers and 155 students. A 10-item questionnaire was used to collect data. The questionnaire item was followed by a single response category based on a 5-point rating scale format of Very High Extent (VHE), High Extent (HE), Moderate Extent (ME), Low Extent (LE) and Very Low Extent (VLE). A test re-test method was adapted to test the reliability of the instrument to obtain a coefficient of 0.65. The data gathered was analyzed using mean and z-test analysis to answer the research questions and hypothesis respectively. The study revealed that absence of technical skills of workshop attendants and motivation of technical instructors are constraints to repairs and maintenances of electronic systems in technical colleges' workshops in Rivers State. Based on the findings, it was recommended among others that an electronic repairs and maintenance company should be established by government which will enable electronic students to enroll for practical internship quarterly.

Keywords: Constraints; Repairs; Maintenance; Electronic System; Technical College; Workshop.

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1. Introduction

Technical education can be referred to as the academic and vocational preparation of students for jobs involving applied sciences and modern technology. It emphasizes the understanding and practical application of basic principles of science and mathematics, rather than the attainment of proficiency in manual skills that is properly the concern of vocational education (Portraits, 2016). Technical education has as its objective the preparation of graduates for occupations that will enable them gain employment in the industry or be self employed. People so employed are frequently called technicians. Technical education is distinct from professional education because it places major emphasis upon the theories, understanding, and principles of a wide body of subject

matter designed to equip the graduate to practice authoritatively in such fields as science and engineering (Portraits, 2016). Portraits went further to expatiate that technical occupations are vital in a wide range of fields, including agriculture, computers and data processing, education, environmental and resource management and industrial design. Its curricula are correspondingly specialized over a broad range of fields like Mechanical technology, Automobile technology, Building technology, Electrical technology and Electronics technology. Technical education is typically offered in both secondary and post-secondary institutions like Technical Colleges, Polytechnics, Colleges of Education and Universities.

In Nigeria, technical colleges also known as technical schools provide specialized training in specific career field or trade. Programs at technical colleges can take anywhere from three years up to six years to complete and a National Business and Technical Examination Board (NABTEB) certificate is obtained. Students attending technical colleges usually take courses related to their core trades during their first few terms of the admission. Technical colleges emphasize hands-on training and offer internship experience in a relevant work setting. The common specific career field or trades are mechanical technology, building technology, electrical technology and electronics technology (Bako, 2009).

Electronic technology is a field of study that implements and applies the control and flow of electrons in a circuit to develop devices and systems. It is a specialized discipline that has more focus on application, theory, applied design, and implementation of the properties of electrons. The control and flow of electrons is made possible by components like transistor, capacitor, resistor, diode and ICs to develop the electronic systems (Robinson, 2008). Electronic system in this context is referred to as any device or equipment that has a physical interconnection of electronic components like resistors, capacitors, transistors and integrated circuits which gathers various amounts of information together. Electronic System has both inputs and outputs with the output being produced by processing the inputs. Also, the input signal(s) may cause the process to change or may itself, cause the operation of the system to change. Therefore, the input(s) to a system is the “cause” of the change, while the resulting action that occurs on the systems output due to this cause being present is called the “effect”, with the effect being a consequence of the cause. There are many ways to represent an electronic system, for example: mathematically, descriptively, pictorially or schematically. Electronic systems are generally represented schematically as a series of interconnected blocks and signals with each block having its own set of inputs and outputs (Sloan, 2010).

In technical colleges, electronics technology deals with the repairs and maintenances of electronic systems (Osho, 2011). Electronic repairs and maintenance is one of the key practical learning carried out in the workshops of technical colleges. Indeed, it is a core objective area in which students of electronic trade are trained to develop competence skills. Electronic repairs and maintenance refer to the installations, operations, troubleshooting, components replacement and services of electronic systems. It involves the operational and functional checks, servicing, repairing or replacing of necessary components and parts in an electronic system (Berendsen, 2013).

However, it has been observed that electronics technology students of technical colleges in Rivers State lack the practical skill of repairs and maintenance of electronic systems in the workshop. It

was found out by Umah and Maaji (2010) that students of technical colleges were unable to successfully carry out practical skills on repairs and maintenance of electronic systems in the workshop. This finding was supported by Makinde, Zambwa and Yakubu (2015) who observed that there are obviously poor skills on repairs and maintenance of electronic systems by students of technical colleges in the workshop. According to Amadike and Agwi (2016), this poor skill is prominent in Rivers State and it is as a result of some constraints. However, Amadike and Agwi (2016) further noted that; to acquire practical skills in repairs and maintenance of electronic systems in the technical colleges, there is need for a consistent practice on repairs and maintenance of electronic systems in the workshop under the guidance of a technically skilled workshop attendants. In addition, Makinde, Zambwa and Yakubu (2015) opined that, there is also need for a good motivation of technical instructors for proper teaching experiences. Workshop attendants in this context are technicians in the workshop who are technically and practically skilled to assist students carry out daily practical learning. They constantly attend to students practical needs within and outside the school time table in the workshop. One of their major objectives is to ensure that students are properly guided in acquiring the required daily practical skills in the workshop. On the other hand, the technical instructors are persons who are saddled with the responsibility of teaching technical subjects, interfaces between classroom and workshop learning, plan and supervise theoretical and practical sections in the college. This invariably means that, poor technically skilled workshop attendants and poorly motivated technical instructors in the college would cause constraints. Therefore, determining whether these two factors are constraints is the essence of this study.

2. Statement of the Problem

Repairs and maintenance of electronic systems in technical colleges is one of the skills being acquired by students in technical colleges; especially those enrolled for electronics technology. Unfortunately, it has been observed that students of electronics technology possess poor skills in repairs and maintenance of electronic systems in technical colleges in Rivers state. This was found out in many authors' findings that indeed students of electronics technology trade in technical colleges are unable to successfully carry out practical skill on repairs and maintenance of electronic systems in the workshops. This problem was said to be very prominent in Rivers State and it was found to be as a result of some constraints. Therefore, the question is, what are the constraints to repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State?

3. Purpose of the Study

The main purpose of this study is to investigate the constraints to repairs and maintenances of electronic systems in technical colleges' workshops in Rivers State. Specifically, the study sought to:

- 1) Determine the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.
- 2) Ascertain the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

4. Research Questions

The following research questions were formulated to guide the study:

- 1) What are the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State?
- 2) What are the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State?

5. Hypotheses

The following null hypotheses (Ho) were postulated and tested at 0.05 level of significance;

- 1) There is no significant difference in the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.
- 2) There is no significant difference in the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

6. Methodology

Descriptive survey was used as the design for the study. The population for the study comprised of all the electrical/electronic trade teachers and students in the technical colleges in Rivers State. It consists of 309 students and 33 teachers from the five technical colleges located in Rivers State. The population for each school is as follows: Government Technical College, Port Harcourt, 80 students and 8 teachers; Government Technical College, Ogu Bolo, 26 students and 4 teachers; Government Technical College, Tombia, 44 students and 5 teachers; Government Technical College, Ahoada, 66 students and 7 teachers and Federal Science Technical College Ahoada, 93 students and 9 teachers. A simple random sampling technique was used to obtain a sample size of 188 which comprised of 33 teachers and 155 students.

A 10-item questionnaire each for teachers and students was used as instrument for the study. The instrument was developed by the researcher and was validated by 3 experts in Industrial and Technology Education. Each questionnaire item was followed by a single response category based on a 5-point rating scale format of Very High Extent (VHE), High Extent (HE), Moderate Extent (ME), Low Extent (LE) and Very Low Extent (VLE). Very High Extent has a rating of (5), High Extent (4), Moderate Extent (3), Low Extent (2) and Very Low Extent (1). A test re-test method was adapted to test the reliability of the instrument and a coefficient of 0.65 was obtained. The mean and z-test statistical analysis were used for the research question and hypothesis respectively. The null hypothesis is rejected if the z-calculated exceeds the z-table; otherwise, the null hypothesis is not rejected.

7. Presentation of Results

The analysis of data in relation to each of the research questions and hypotheses are presented as follows;

Research Question 1: What are the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State?

Table 1: Teachers and students responses on technically skilled workshop attendants

S/N	Items	Teachers			Students		
		Mean (X)	Std. Dev. (SD)	Dec.	Mean (X)	Std. Dev. (SD)	Dec.
1	Workshop attendants are technically skilled in the installation of electronic systems in the workshops.	1.9	1.1	LE	1.9	1.2	LE
2	Workshop attendants are technically skilled in the operation of electronic systems in the workshops.	2.5	1.5	ME	2.3	2.2	LE
3	Workshop attendants are technically skilled in the troubleshooting of electronic systems in the workshops.	2.1	1.2	LE	1.9	1.2	LE
4	Workshop attendants are technically skilled in components replacement in electronic systems in the workshops.	1.9	1.1	LE	1.9	1.2	LE
5	Workshop attendants are technically skilled in the servicing of electronic systems in the workshop.	2.4	1.3	LE	1.9	1.2	LE
Average Mean and Standard Deviation respectively		ΣX 2.16	ΣSD 1.24	LE	ΣX 1.98	ΣSD 1.40	LE

Source: Researcher

In table 1, apart from item 2 which indicates a Moderate Extent (ME), all the items in teachers' responses indicate a Low Extent (LE). This reveals their opinion that workshop attendants are poorly skilled technically on the repairs and maintenance of electronic systems in technical college's workshop. Similarly, all the items in the students' responses indicate a Low Extent (LE); revealing that workshop attendants are poorly skilled technically on the repairs and maintenance of electronic systems in technical college's workshop.

The average mean response of students and teachers for the statement items were found to be respectively 1.98 and 2.16. These indicate Low Extent (LE), revealing that both teachers and students are of the opinion that workshop attendants are poorly skilled technically on the repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

Research Question 2: What are the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State?

Table 2: Teachers and students responses on the motivation of technical instructors

S/N	Items	Teachers			Students		
		Mean (X)	Std. Dev. (SD)	Dec.	Mean (X)	Std. Dev. (SD)	Dec.
6.	Regular and punctual salary and allowances of technical instructors are given in the college.	1.6	0.9	LE	1.9	1.2	LE
7.	Moral supports are usually given to technical instructors involved in repairs and maintenance of electronic systems.	1.6	1.0	LE	1.9	1.3	LE
8.	Award is usually given to performing technical instructors in the college yearly.	2.8	1.4	ME	2.7	1.4	ME
9.	Compensation is paid to technical instructors who got injured in course of services in the workshop	2.7	1.4	ME	1.9	1.2	LE
10.	Technical instructors are usually sponsored to technical conferences in the college.	2.4	1.3	LE	2.0	1.3	LE
Average Mean and Standard Deviation respectively		ΣX 2.22	ΣSD 1.20	LE	ΣX 2.08	ΣSD 1.28	LE

Source: Researcher

In table 2, apart from items 8 and 9 which indicate Moderate Extent (ME), all the items in teachers' responses indicate a Low Extent (LE). This reveals that the technical instructors are poorly motivated on the repairs and maintenance of electronic systems in technical colleges' workshops. Similarly, apart from item 8, all the items in the students' responses indicate a Low Extent (LE); revealing that technical instructors are poorly motivated on repairs and maintenance of electronic systems in technical colleges workshops.

The average mean response of students and teachers for the statement items were found to be respectively 2.08 and 2.22. These indicate Low Extent (LE), revealing that both teachers and students are of the opinion that technical instructors are poorly motivated on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers state.

Hypothesis 1: There is no significant difference in the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

Table 3: Z – test analysis on technically skilled workshop attendants as constraints to repairs and maintenance of electronic systems

SUBJECTS	\bar{X}	SD	N	STANDARD ERROR	Z-CAL	Z-CRIT	D.F	P
TEACHERS	2.16	1.24	33	0.09	2.00	1.96	186	0.05
STUDENTS	1.98	1.40	155					

From table 3, since the calculated value of z (2.00) is greater than the critical value of z (1.96), the null Hypothesis is rejected. This means that there is significant difference in the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State

Hypothesis 2: There is no significant difference in the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

Table 4: Z – test analysis on the motivation of technical instructors as constraints to repairs and maintenance of electronic systems

SUBJECTS	\bar{X}	SD	N	STANDARD ERROR	Z-CAL	Z-CRIT	d.f	P
TEACHERS	2.22	1.20	33	0.09	1.62	1.96	186	0.05
STUDENTS	2.68	1.28	155					

In table 4, since the calculated value of z (1.62) is less than the critical value of z (1.96), the null Hypothesis is accepted. This means that there is no significant difference in the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

8. Results and Discussions

The first finding of this study revealed that the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State are low. This means that, the workshop attendants in the workshops are poorly skilled technically to enhance the repairs and maintenance of electronic systems. The poor technical skills of the workshop attendants have affected repairs and maintenance of electronic systems in technical colleges; hence poor technical skills of the workshop attendants is a constraint to repairs and maintenance of electronic systems in technical college's workshops in Rivers State. The finding is in support with the view of Amadike and Agwi (2016), stated that technical personnel who possess relevant skill for the development of technical education programme through quality training should be present in the workshops. It again consolidated the view that technical college workshop cannot be useful without the daily presence of technically skilled workshop attendants (Dibia & Ojotule, 2018). The finding also indicated that there is a significant difference in the mean responses of teachers and students about the extent of technical skills of workshop attendants on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State. This means both teachers and students in reality have divergent views on the poor technical skills of the workshop attendants as a constraint.

Notwithstanding, they are seen as two distinct groups playing different roles. The teachers though had a mean response which was slightly different from the students mean response. The meaning is that, the students are of the view as though workshop attendants are poorly skilled, while the teachers are of the view that workshop attendants are skilled but not quite well.

The second finding revealed that the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State are low. Meaning that, the technical instructors are poorly motivated in the repairs and maintenance of electronic systems; hence poor motivation of technical instructors is a constraint to repairs and maintenance of electronic systems in technical college's workshops in Rivers State. The finding was supported by Idogho, (2012) view when he wrote that the non-motivation of teachers affects their performance. Again, the finding is in tune with the view of Sargent and Hannum (2009) that lack of motivation is a serious problem affecting teaching and learning quality in most schools in Nigeria. The finding also indicated that there is no significant difference in the mean responses of teachers and students about the extent of motivation of technical instructors on repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State. This means both teachers and students in reality have the same view that technical instructors are not motivated in the repairs and maintenance of electronic systems in technical colleges' workshops in Rivers State.

9. Conclusions

The study sought to investigate the constraints to repairs and maintenances of electronic systems in technical colleges' workshops in Rivers State. From the data analysis and findings, it can be conclusively said that the poor technical skill of workshop attendants and the poor motivation of technical instructors are constraints to repairs and maintenances of electronic systems in technical colleges' workshops in Rivers State. These two factors have been relegated to the background in technical colleges in Rivers State. Consequently, repairs and maintenances of electronic systems in technical colleges' workshops has become epileptic and hence affecting students' practical skill acquisition in electronic technology trade.

10. Recommendations

Based on the findings, the following recommendations are made here with

- 1) Since the poor technical skill of workshop attendants in the workshop is a constraint to repairs and maintenance of electronic systems in technical colleges' workshops, it is recommended that an electronic repairs and maintenance company should be established by government which will enable electronic students to enroll for practical internship quarterly.
- 2) Since the poor motivation of technical instructors is a constraint to repairs and maintenance of electronic systems in technical colleges' workshops, it is recommended that welfare board should be established by government in order to cater for the needs of technical instructors.

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