
CONSTRAINTS ON EFFECTIVE TEACHING AND LEARNING OF ELECTRICAL/ELECTRONICS TECHNOLOGY IN TECHNICAL TRAINING INSTITUTIONS IN RIVERS STATE

By

Amadike Okechukwu, Ph.D

*Department of Industrial Technology Education,
Michael Okpara University of Agriculture,
Umudike-Abia State.*

And

Vincent I. A. Agwi

*Department of Science/Technical Education,
Rivers State University of Science & Technology, Nkpolu,
Oroworukwo, Port Harcourt,
Rivers state.*

Abstract

The study was conducted to investigate the constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State. Three research questions and three research hypotheses were formulated to guide the study. The population was made up of 400 electrical/electronics Year III and Year IV students including 40 electrical/electronics technology Lecturers, The study sample comprised 200 selected students while all the 40 electrical/electrical technology lecturers were included without sampling because they were few. Mean was employed to answer the research questions while z-test analysis was employed to test the hypotheses. Results revealed that qualified instructors of electrical/electronics technology are lacking in technical training institutions in Rivers State, tools and equipments in the workshop are obsolete to carry out operations in the workshop motivation for the Instructors is poor. Useful suggestions were made by the researcher based on the findings that if holistically implemented will help to take care of the constraints revealed in this study.

Technical education programme from research findings over the years have been described as the only programme that will help to provide the graduates of technical education with necessary practical knowledge and psychomotor skills that will help them live useful life and become self-reliant, employers of labour without looking for white

collar-jobs in government offices and establishments on graduation (Agwi, Amadike and Ejimaji 2016). Training of students in technical training institutions that will help to realize this aim requires the service of a qualified instructor who have gotten a sound knowledge in his/her area of specialization that can operate and instruct with available tools/equipment in the workshop (Ahiauzu, 2015). Okwelle (2014) maintained that, for effective teaching and learning of technical education courses like electrical/electronics technology to take place, that the learning environment should be conducive for teaching and learning. The environment here according to him refers to the facilities available for instruction. These facilities he further stated pose a strong influence on the teaching and learning process and so there is need for adequate classroom building with good sitting arrangement for classroom teaching, availability of well-equipped school workshops and laboratories with modern machine, tools, materials for practical works. According to Ogbuanya & Okoli (2004), the main trust of technical vocational education training is to develop skills in the learners. Skills that are practical in nature, these relevant skills according to them are skills of constructing, designing and repair which can only be acquired in a well functional work shop-stucked with relevant equipment and facilities.

At all levels of the nation's educational system and for all known and existing school types, instructional resources or teaching and learning materials are all indispensable factor in the attainment of educational goals (Umar & Abdulahi, 2012). In support of the above view, Audu & Mohamad (2013), stated that school workshops offer opportunities for practical training of students in skills acquisition in their technical trade areas for future development of the key sectors of the economy in order to meet the basic needs of electricity, roads and machinery, among others. Students' practical projects are an important part of the curriculum in TVE, but a supportive school environment is a fundamental requirement for the successful implementation of curriculum. This aspect of the curriculum can only be implemented where workshop facilities, tools, equipment and machines are adequate and relevant. Availability of appropriate workshop facilities enhances students learning by allowing them to be involved in demonstration. Agwi (2014), agreed with the above view and added that for effective teaching and learning in the workshop with the use of modern tools and equipment that will enable students to effectively participate in practical work in the workshop, that the teacher- students ratio should be kept at 1:20. James (2007), maintained that another major draw back in the present technical education courses like electrical/electronics technology is lack of adequate spelt out workshop instructional activities. Odigbo & Okafor (2010), stated clearly that technology education with practical in standard workshop without modern tools and equipment will not produce the required result of training aspire to give to learners. Another important issue that must be taken serious for effective teaching and learning of technical education courses is the motivation of the instructors. Okonkwo (1998), stated that motivation when present makes an instructor/teacher to be happy as they have a general uplifting effect upon his performance and his attitude towards task. To motivate an instructor is essential for effective performance. Nwankwo (2001), added that motivation is an inner force or desire to achieve a certain goal, he further maintained that motivation is an internal state which urges an individual to behave in a certain way

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towards a goal and such behaviour persists until the goal is achieved. Types of motivation according to Ikenyiri (2001), include, intrinsic motivation and extrinsic motivation.

The teaching and learning of technical education courses in the training institutions in Nigeria need to be effective. The study conducted by Nwanoruo (2006), James (2007), and Nwankwo (2007), revealed that training given to learners in most of the tertiary institutions offering technology education courses are hardly supported with educational resources. In many schools, the non-availability of these facilities and lack of interest to work by the instructors is more striking than the condition of these schools. Given the scenario above, the situation at technical training institutions might not be different. The researchers therefore took up the task of investigating constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State in order to make useful suggestions for improvement.

Statement of the Problem

There are many problems affecting the effective teaching and learning of technical education courses such as electrical/electronics technology. The teaching and learning in the technical training institutions in Rivers State seem to be ineffective. This seems to be as a result of lack of instructors to teach electrical/electronics, inadequate infrastructure and inadequate motivation for the instructors.

These suspected inadequacies need to be addressed properly to ensure that the right training environment prevails to enable the instructors in training institutions to function very effectively to enhance adequate skills acquisition among the students. This study was therefore conducted to find out the inadequate provision that affect teaching and learning of electrical/electronics technology in technical training institutions in Rivers State.

Purpose of the study

The main purpose of the study is to investigate the constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State. Specifically, the study determined constraint factors in respect to:

1. Number of qualified instructors for the teaching and learning of electrical/electronics technology in technical training institution in Rivers State.
2. Tools/equipment in technical training institutions for teaching and learning of electrical/electronics technology
3. Technical instructors motivation for teaching and learning of electrical/electronics technology in technical institutions in Rivers State.

Research questions

The following research questions were posed to guide the study:

1. What factors in relation to qualified instructors are constraints on effective teaching and learning electrical/electronics technology in technical training institutions in Rivers State?
2. What factors in relation to tools/equipment in the institutions workshops are constraints on effective teaching and learning electrical/electronics in technical training institutions in Rivers State.
3. What factors in relation to staffs motivation are constraints on effective teaching and learning electrical/electronics technology in technical training institution n Rivers State?

Hypotheses

The following hypotheses were generated and tested at .05 level of significance.

H₀₁: There is no significant difference in the opinions of the instructors and students on factors in relation to qualified instructors as constraints on effective teaching and learning of electrical/electronics technology.

H₀₂: There is no significant difference in the opinions of the instructors and students on factors in relation to tools/equipment in the institutions workshop as constraints on effective teaching and learning of electrical/electronics technology.

H₀₃: There is no significant difference in the opinions of the instructors and students on factors in relation to staffs motivation as constraints on effective teaching and learning electrical/electronics technology.

Methodology

Descriptive survey research design was adopted in this study aimed at investigating constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State. Factors in relations to qualified instructors, factors in relation to tools/equipment and factors in relations to staffs motivation. The instrument has two sectors, A and B. Section A dealt with the respondents bio-data while Section B has 3 parts namely, qualified technical instructors, tools and equipment available in the workshop and motivation of staffs. Each part of the area was made up eleven, eight, eleven items. The instrument was based on four point scale. Items was constructed to elicit information from respondents on whether there is qualified instructors to teach electrical/electronics technology, whether the tools and equipment in the workshop is adequate for teaching and learning and whether instructors of electrical/electronics are properly motivated. In all, the instrument was made up of thirty (30) items.

The four point scale has four response categories as, Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1). The total scores on the constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State was obtained by adding the index of the scale. The research instrument was validated by two experts from department of science and technical education and two

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experts from department of measurement and evaluation, Rivers State University of Science and Technology, Nkpolu, Oroworukwo, Port Harcourt. Pilot test was done to test the reliability of the research instrument. The reliability yielded .86 using the Person Product Moment Correlation Coefficient (r). Simple random sampling method was used to select 200 hundred students while all the 40 lecturers were included without sampling because they were few. The instrument was administered by the researcher with the aid of two research assistants. Data collected was analyzed using the statistical package for social science (SPSS). Mean score were extracted and used to answer the research questions and z-test analysis were used to test the hypotheses at .05 level of significance. Items with mean value of 2.50 and above were considered agree, while items with mean value of 2.49 and below was considered disagree.

Results

The following table shows the summary of the analysis of data in relation to each of the research question.

Research question 1

What factors in relation to qualified instructors are constraints on effective teaching and learning electrical/electronics technology in technical training institutions in Rivers State?

To provide answer to this research question, data were collected in relation to items 1 - 11. The analysis is presented in Table 1.

Table 1: students and lecturers mean score on what factors in relation to qualified instructors are constraints on effective teaching and learning electrical/electronics technology in technical training institutions in Rivers State.

Table 1: Students and Lecturers mean scores on what factors in relation to qualified instructors are constraints on effective teaching and learning electrical/electronics technology in technical training institutions in Rivers State.

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S/n	Items	Respondents Instructors N = 40		Respondents Students N = 200		Decision
		\bar{x}	S.D	\bar{x}	S.D	
1.	Electrical/Electronics instructors in your school are well trained instructors for teaching	3.50	0.64	3.19	1.29	A
2.	Instructors of electrical/electronics in your school are creative in teaching.	3.43	0.96	2.91	1.29	A
3.	<i>Instructors of electrical/Electronics in your school have the ability to motivate students in learning.</i>	3.35	0.98	2.90	1.17	A
4.	There are enough qualified electrical /electronics instructors in your school.	3.15	0.98	2.99	2.00	A
5.	Electrical/Electronics instructors in your school possess good teaching qualification.	2.98	1.12	3.02	1.22	A
6.	Instructors of electrical / Electronics in your school have good knowledge and skill to teach the students.	3.50	0.56	3.08	0.80	A
7.	Instructors of electrical/Electronics in your school are hard working in teaching	2.95	0.96	3.45	0.83	A
8.	Instructors of electrical/electronics in your school are normally regular in class.	3.28	0.65	3.38	0.68	A
9.	Instructors of electrical/electronics in your school are initiative in teaching	3.28	0.55	3.41	0.63	A
10.	Instructors of electrical / Electronics in your school are discipline enough to be instructors	2.88	1.14	3.33	0.84	A

11. Instructors of electrical/electronics in your school normally supervised students work during practical period in the workshop

Gx = 3.27 0.83 3.08 0.98

Cut off = 2.50

Table 1 shows the rating of the respondents on factors in relation to qualified instructors as constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State. It can be seen from the table that the mean for items 1, 2, 3, 4, 5, 5, 6, 7, 8, 9 and 10 ranged from 2.50 to 3.27 which indicates positive response because they were above 2.50, while the mean for item 11 ranged from 2.27 to 2.40 which indicates negative response because they were below

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2.50. From the above table, the number of instructors to teach electrical/electronics in the training institutions in Rivers State are qualified but were few in number.

Research question 2

What factors in relation to tools/equipment in the institutions workshops are constraints on effective teaching and learning electrical/electronics technology in technical training institutions in Rivers State?

To provide answer to this research questions, data were collected in relation to items 12-19. The analysis is presented in Table 2.

Table 2: Students and lecturers mean score on what factor in relation to tools/equipment in the workshops are constraints on effective teaching and learning of electrical/electronics technology.

S/n	Items	Respondents Instructors N = 40		Respondents Students N = 200		Decision
		\bar{x}	S.D	\bar{x}	S.D	
12.	Existing equipment in your school workshops should be replaced completely with modern ones for teaching	2.75	0.44	3.89	0.32	A
13.	Tools and equipment in your school workshops are normally maintained regularly.	3.25	0.98	2.44	0.79	A
14.	Your school have standard electrical/ electronics tools/equipped in the workshop	2.08	1.25	2.40	1.30	D
15.	Tools and equipment in your school workshops are enough for the number of the students	2.15	1.34	2.47	1.33	D
16.	Tools and equipment in your school workshop absolute	2.20	1.38	2.40	1.40	D
17.	Workshop tools/equipment are inadequate for the number of students in your school.	3.38	0.45	3.47	0.50	A
18.	Your school workshop is yet to be equipped with computer numerical control machines.	3.38	0.45	3.49	0.50	A
19.	Tools/equipment in your school workshops are normally being used by students of electrical/electronics during practical period.	3.25	0.44	3.30	0.46	A
	GX =	2.93	0.85	3.13	0.83	

Cut off = 2.50

Table 2 shows the rating of the respondents on what factors in relation to tools/equipment in the institutions workshop are constraints on effective teaching and

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learning of electrical/electronics technology in technical training institutions in Rivers State. It can be seen from the table that the mean for items 12, 13, 17, 18 and 19 ranged from 2.50 -3.89 which indicates positive response because they were above 2.50 while the mean for items 14, 15 and 16 ranged from 2.08-2.40 which indicates negative response because they were below 2.50. From table 2 above, tools/equipment in the training institutions workshop in Rivers State are not adequate for effective teaching and learning of electrical/electronics technology.

Research question 3

What factors in relation to staff motivation are constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State?

To provide answer to this research question, data were collected in relation to items 20 - 30.

The analysis is presented in Table 3.

Table 3: Students and lecturers mean score on what factors in relation to staff motivation that are constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State.

S/n	Items	Respondents Instructors N = 40		Respondents Students N = 200		Decision
		\bar{x}	S.D	\bar{x}	S.D	
20.	Salary of your instructors are normally paid to them in time	2.18	1.36	2.20	0.48	D
21	Instructors of your school are living better by the salary that they receive	1.65	0.89	2.21	1.18	D
22.	Payment or leave allowance of your school instructors are regular	2.81	1.08	2.17	0.61	D
23.	Special allowance is normally paid to your school instructors for hard working.	2.25	0.67	2.46	0.84	D
24.	Your instructors are enjoying free accommodation in your school.	2.30	1.32	2.27	0.93	D
25.	Your instructors are enjoying free medical service	2.75	1.13	2.90	1.09	A
26.	There are good furniture's in the office of your instructors	1.98	1.19	2.41	0.64	D
27.	Special reward are normally be giving to instructors of your school for hardworking	2.33	1.35	2.06	1.25	D
28.	Promotion of your school instructors is normally as at when due	2.33	1.35	2.19	1.36	D
29.	Promotion of your school instructors is regularly done	2.10	0.71	2.10	0.77	D
30.	The office of your school instructors have air condition.	2.40	0.74	2.23	0.75	D
	$G\bar{x} =$	2.21	1.05	2.69	0.90	

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Cut off-2.50

Table 3 shows the rating of respondents on what factors in relation to staff motivation that are constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State. It can be seen from the table that the mean of item 25 is 3.75 and 2.90 which indicates positive response because they were above 2.50 while the mean for items 20, 21, 22, 23, 24, 26, 27, 28, 29 and 30 ranged from 1.98 to 2.40 which indicates negative response because their mean were below 2.50. From table 3 above, instructors of electrical/electronics technology in technical training institutions in Rivers State are not motivated by the authorities of the training institutions and this has affected their interest to work.

Hypotheses

HO1: There is no significant difference in the opinions of the instructors and students on factors in relation to qualified instructors that are constraints on effective teaching and learning of electrical/electronics technology.

The result is presented in Table 4 below.

Table 4: z-test analysis of students and instructors opinions on what factors in relation to qualified instructors that are constraints on effective teaching and learning of electrical/electronics technology

Respondents	N	X	SD	z-cal	z-crit	P	df	Decision
Lecturers	40	3.27	0.83	1.277	1.960	.05	238	Do not reject H_0
Students	200	3.08	0.98					

Note: $P > 0.05$, df (238).

(Field study, 2015).

Table 4 reveals that 40 lecturers of the three technical training institutions had a mean rating of 3.27 (SD = 0.83) and the 200 students a mean rating of 3.08 (SD = 0.98). Yielding a calculated z-value of 1.28, since the critical z-value of 1.96 is more than z-calculated at df = 238 and .05 level of significance. The null hypotheses (1) was therefore, not rejected. The implication of this result is that there is no significant difference between the lecturers and students on what factors in relation to qualified instructors as constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State.

Ho2: There is no significant difference in the opinions of instructors and students on factors in relation to tools/equipment in the institutions workshop as constraints on effective teaching and learning of electrical/electronics technology.

The result is presented in Table 5 below.

Table 5: z-test analysis of instructors and students opinions on what factors in relation to tools/equipment in the institution workshop as constraints on effective teaching and learning electrical/electronics technology.

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Respondents	N	X	SD	z-cal	z-crit	P	df	Decision
Lecturers	40	2.93	0.845					
Students	200	3.12	0.825	1.37	1.96	.05	238	Do not reject

Note: P> 0.05, df (238) (Field study, 2015),

Table 5 reveals that 40 lecturers has a mean rating of 2.93 (SD = 0.845) while the 200 students had a mean rating of 3.13 (SD = 0.825) yielding a calculated z-value of 1.369. Since the calculated z-value of 1.369 is less than the critical z-value of 1.960 at df = 238 and .05 level of significance, the null hypotheses (2) is therefore, not rejected. The implication of this result is that there is significance difference between the lecturers and students on what factors in relation to tools/equipment in the institutions workshop as constraints on effective teaching and learning electrical/electronics technology.

hos: There is no significant difference in the opinions of the instructors and students on factors in relation to staffs motivation as constraints on effective teaching and learning electrical/electronics technology.

The result is presented in Table 6 below.

Table 6: z-test analysis of instructors and students opinions on what factors in relation to staffs motivation as constraints on effective teaching and learning electrical/electronics technology.

Respondents	N	\bar{x}	SD	z-cal	z-crit	P	df	Decision
Lecturers	40	2.21	1.05					
Students	200	2.69	0.9	2.605	1.96	0.05	238	Do not accept

Note: P> 0.05, df (238) (Field Study, 2015)

Table 6 reveals that 40 lecturers had a mean rating of 2.21 (SD=1.05) and the 200 students a mean rating of 2.69 (SD = 0.9) yielding a calculated z-value of 2.70. Since the calculated z-value of 2.70 is greater than the critical z-value of 1.96 at df = 238 and .05 level of significance, the null hypotheses is therefore, not accepted. The result is that there is no significant difference between the mean responses of the instructors and the students that poor motivation for the instructor affects the teaching and learning of electrical/electronics technology.

Summary of Major Findings

The following were the findings of the study:

1. There are well trained electrical/electronics instructors in the technical training institutions but there numbers were few
2. The ratio of instructors to students in the workshop during practical period is below standard as recommended by Federal Republic of Nigeria in the National Policy on Education which states 1:20
3. Instructional facilities in all the three technical training institutions are not

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adequate for effective teaching and learning of electrical/electronics technology.

4. Existing tools/equipment in the workshops of these technical institution needed to be replaced immediately for effective teaching and learning
5. Instructors of electrical/electronics technology in the technical training institutions are not well motivated
6. In-service training programme of instructors of the three technical training institution are not been organized regularly.

Discussion of findings

The findings of this study revealed that there are well trained and qualified electrical/electronics technology instructors in the technical training institutions in Rivers State but that there numbers were few. This problem should be corrected, since the training of students in technical training institutions that will help to realize the objectives of training students to acquire necessary practical knowledge and psychomotor skills that will help them live useful life and become self-reliant, employers of labour without looking for white collar jobs requires the service of a good number of qualified instructors who have gotten a sound knowledge in his/her area of specialization that can operate and instruct with available tools/equipment in the workshop (Ahiauzu, 2015).

The implication of these findings is worrisome because a situation whereby the numbers of students is much greater than that of instructors in the workshop during practical period will cause the instructor to spend much time in talking instead of going ahead to demonstrate operations to the students. Again the recommended ratio of instructors to students 1:20 in the national policy on education will not be realized. Students work after practical period will not be properly supervised and this will not help them to acquire the required practical skills that they needed.

In terms of the tools/equipment in the technical training institutions workshops, it is sad to observe from the findings of this study that they are not adequate for instructional process. These findings contradicts the opinions of Okwelle (2014) who believed that for effective teaching and learning of technical education courses like electrical/electronics technology to take place, that the learning environment should be conducive for teaching and learning. This environment here according to him refers to the facilities available for instruction which are the tools/equipment and machine. A situation whereby the available tools/equipment and machine in the workshop are the types that is out-dated will cause the instructor to spend more time in talking instead of going ahead to demonstrate the lesson to students. The consequence of this ugly situation to the students will be lost of interest and under this point no commensurable positive learning outcome on the part of students will be achieved as the whole teaching process will sound abstract to them. Furthermore, the students will not also be able to acquire relevant skills and knowledge needed to be self-employed in the industry on graduation if they did not learn with standard tools/equipment and machine while in the school.

The findings of this study also revealed that instructors of electrical/electronics technology of technical training institutions in Rivers State are not properly motivated. A situation whereby this type of problem exist, the instructors will abandon their duty and

look for alternative means of catering for their self and family. This findings contradicts the opinion of Okonkwo (1998), who believed that motivation when present makes an instructor to be happy as they have a general uplifting effect upon his/her performance and his/her altitude towards task. The implication of these finding is worrisome as the result of this problem of lack of motivation will cause problem like regular strike on the side of the instructors and lack of interest to work.

An aspect of the result of this study reveals no significant difference between the responses of the lecturers and students on what factors in relation to tools/equipment in the institutions workshop as constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State.

Conclusion

This study investigated constraints on effective teaching and learning of electrical/electronics technology in technical training institutions in Rivers State. The study revealed that for effective teaching and learning of electrical/electronics, more qualified instructors are needed. Tools and equipment in the workshops/laboratories in these institutions needed to be replaced completely with modem ones. Government on their own side should ensure that incentives meant for instructors are released in time, while those due for promotion should be promoted immediately. Instructors should be sponsored for in-service training for this will help them to up-date their knowledge on current issues on TVE.

Recommendations

Following the result of the study, the researchers made the following recommendations:

- Instructors should always supervise students work during practicals in the workshop. Teacher - students ratio during practical period should be kept at 1:20 for effective teaching and learning
 - Tools and equipment in the school workshop as a matter of urgency should be replaced with modern ones in the market
 - Workshop attendants should be employed in school workshops to take care of tools, equipment and machines in the workshop
- Instructors of electrical/electronics technology should ensure that demonstration strategy is adopted in the workshop during teaching and learning period. School authorities should as a matter of urgency ensure that instructors that are due for promotion are promoted regularly.
- Finally, allowance for instructors should be given to them as at when due for this will go along way in motivating them to work.

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