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Influences of Inadequate Instructional Materials and Facilities in Teaching and Learning of Electrical/Electronics Technology Education Courses

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Abstract
This study investigated the influences of inadequate instructional materials and facilities in the teaching and learning of electrical/electronics (E/E) technology education courses. The study was guided by two research questions and two null hypotheses which were tested at 0.05 level of significance. The design employed was descriptive survey with a population of 56 Electrical/Electronic teachers and students. Due to this few population size no sampling was carried out. Validated questionnaire with 0.89 reliability coefficient was used for data collection. The collected data were analyzed using mean and standard deviation to answer the research questions while t-test statistic was used to test the hypotheses. Findings made were that inadequate instructional materials and facilities often influence the teaching and learning of Electrical/Electronic technology courses in 32 negative ways. Based on these finding, it was recommended that all concerned should join hands to adequately provide effective and efficient instructional materials and facilities in other to eradicate all the negative influences of inadequate instructional materials and facilities.

Introduction
Federal Republic of Nigeria (2008) defined technology education as tertiary education offered in the Universities, polytechnics, monotechnics and colleges of education (Technical) for the production of high level skilled manpower who can apply scientific knowledge to solve environmental problems, provide goods and services for the convenience of man. Its cardinal goals are to: (1) provide the technical knowledge and skills necessary for agricultural industrial, commercial and economic development of Nigeria (2) give training that impart the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self-reliant. To achieve these and other goals of technology education, adequate instructional materials and facilities are highly needed. FRN (2004) stated that vocational education is that form of education which leads to the acquisition of practical and applied skills as well as basic scientific knowledge. Hence, it can be known that technology is a paramount aspect of human life. Technology refers to the use of products of creativity, inventions and scientific research in the service of man. Electrical and electronics technology education is one of the major options or special areas offered in Nigerian Universities under the department of technology and vocational education.

However, the teaching and learning of electrical/electronic specialized area as a field of study in technology education is vital in the production of workforce with potent understanding and diverse skills in the design, development, production, management and utilization of current electrical and electronics devices and circuits.

According to Carribbean (2001), electrical and Electronics Technology is a field of study that provides both theoretical and hands-on knowledge of current electrical and electronics devices and circuits. Hence, Electrical and Electronics Technology (EET) education syllabus is designed to provide the essential fundamental knowledge and the analytical, practical and experimental skills necessary for a lifelong career in the field of electrical and electronics technology. It also provides students with fundamental knowledge and skills for the workplace and professional pedagogy skills in electrical and electronics field.

Meanwhile, for effective teaching and learning of electrical and electronics technology education, instructional materials and facilities are necessary. Instructional materials and facilities on their own help to facilitate teaching and learning and are used to influence concrete and permanent change in technical behaviour..

According to Eya (2006) instructional materials are all forms of information carriers which can be used to record, store, preserve, transmit, concretize or retrieve information for the purpose of teaching and learning. Wale (2006), was of the opinion that the use of instructional materials would make discovered facts glued firmly to the memory of students. According to Ogwa (2002), instructional materials include audio visual aids, tools, equipment, machines, educational materials such as chats and ICT instructional resources. He also said that, instructional aids mean all the materials or teaching aids or material resources which the teacher utilizes for the purpose of making teaching and learning more effective and meaningful to students.

In the same sense, instructional facilities for vocational and technical education encompasses all basic hand tools, equipment, classrooms, workshops, laboratories, electrical and electronics instruments among others which help the learners to learn properly (Bulama, 2001). This means that technology and vocational education

programmes required tools and equipments that will help in the facilitation of the acquisition of occupational skills in the diverse areas of electrical and electronics technology, Anyakoha (1994), observed that useful skills can be developed and reinforced by the appropriate selection and use of instructional facilities, materials and tools.

However, upon the usefulness of instructional materials and facilities in the teaching and learning of electrical and electronics technology education, the present situation unveils the scarcity and inadequate instructional materials in technology and vocational education programmes in Ebonyi State University. The problem of this study is that the researcher found out that hundred percent of classroom teachers do not use films, slides, film strip, overhead projectors, tools, ICT resources, machines and equipment while teaching. At times some of the instructional materials are not available in the right amount and quality to ensure effective utilization. Most electrical/electronic teachers do not locally improvise known foreign electricity teaching aids because of funds and experience. Olarewaju (1984) in Owoh (2009 said that, the inadequacy of funding in science and technology teaching is acute, more so at this time that the country is struggling to get out of the quagmire of economic recession.

The effects of all these inadequate instructional materials and facilities in the teaching and learning of electrical and electronics courses have not been determined so that all concerned will provide adequate solution. The general purpose of this study is to determine the influence of, inadequate instructional materials and faculties on the effective teaching and learning of electrical and electronics technology education courses in Ebonyi State University.

Research Question

The following research questions were formulated to guide this study:

1. What are the influences of inadequate instructional materials and facilities on teachers effective teaching of electrical and electronics technology education courses?
2. What are the influences of inadequate instructional materials and facilities on students' effective learning of electrical and electronic technology education courses?

Hypotheses

This research was guided by the following hypotheses which were tested at 0.05 level of significance.

HO_1: There will be no statistical significant difference between the responses of teachers and those of students on the influences of inadequate instructional materials and facilities on the effective teaching of electrical and electronics technology education courses

HO_2: There will be no statistical significant difference between the responses of teachers and those of students on the influences of inadequate instructional materials and facilities on the effective learning of electrical and electronics technology education courses.

Methodology

This study adopted descriptive survey research design. The area of the study was Ebonyi State and it was specifically carried out in the Department of Technology and Vocational Education of Ebonyi State University, Abakaliki, where Electrical and Electronics Technology Education Courses are taught by teachers and learnt by students. The population of the study was made up of five (5) lecturers (Teachers) and 50 Students that offer electrical/electronic (E/E) technology education, making a total of 56 subjects. The study involved a population of few persons that can be fully studied, therefore no sampling was carried out. The instrument for data collection was a structured questionnaire with a four-point response scale of: strongly Agree (4), Agree (3), Disagree (2) and strongly disagree (1). The instrument was face validated by two experts in technology and vocational education and one expert from the area of measurement and evaluation. Their criticisms and suggestions were integrated in the final draft to improve the instrument holistically.

The instrument was trial tested on equivalent subject twice with two weeks interval and the results were used to compute the coefficient of stability reliability of the instrument with the figure 0.89 obtained. The instrument was therefore confirmed to be both valid and reliable enough. It was then administered directly to the subjects for their responses with the aid of two research assistants. Due to the high level enlightenment of the respondents, all the 56 questionnaire sent out were all correctly completed and returned for analysis, representing 100% return rate. Mean and standard deviation were used to answer the research questions while the student t-test statistic was used to test the hypotheses at 0.05 level of significance.

Results

The data collected were analyzed and the results are presented in the tables below in line with the research questions and hypotheses.

Research Question I

What re the influences of inadequate instructional materials and facilities on teachers effective teaching of electrical and electronics technology education courses?

The results of analysis of data relating to this research question are presented in table 1 below.

Table 1.
Mean and Standard Deviation of Responses on the Influences of Inadequate Instructional Materials and Facilities in the Teacher's Effective Teaching of Electrical/Electronics Technology Education Courses

S/N	Items	SA	A	D	SD	X	Std	Decision
1	Inadequate instructional materials and facilities make electrical and electronics teachers to dissipate a lot of energy during lesson delivery without achieving much.	30 120	16 48	7 14	3 3	3.31	0.89	Agreed
2	Inadequate instructional materials and facilities cause a lot of discouragement on electrical and electronics teachers.	31 124	7 21	3 6	15 15	2.96	1.31	Agreed
3	Inadequate instructional materials and facilities hinder concrete technical instruction.	36 144	10 30	5 10	5 5	3.38	0.98	Agreed
4	Inadequate instructional materials and facilities make teachers not to feel energized to teach well.	36 144	16 48	4 8	- -	3.59	0.63	Agreed
5	Inadequate instructional material and facilities make electrical/electronics teacher rely on abstract and theoretical teaching.	41 164	2 6	3 6	10 10	3.32	1.19	Agreed
6	Inadequate instructional materials and facilities reduce teacher's motivation to teach well.	30 120	16 16	7 14	3 3	3.31	0.89	Agreed
7	Effective teaching is hindered by inadequate instructional materials and facilities.	22 88	10 30	6 12	18 18	2.64	1.30	Agreed
8	Electrical/electronics teacher's time are wasted due to inadequate instructional materials and facilities.	29 1.16	14 42	10 20	3 3	3.23	0.93	Agreed
9	Electrical/electronics teachers use lecture methods only due to inadequate instructional materials and facilities.	20 80	15 45	10 20	11 11	2.79	1.14	Agreed
10	Inadequate instructional materials and facilities make teaching electrical/electronics exercise very boring to teachers.	18 72	27 81	6 12	5 5	3.04	0.89	Agreed
11	Electrical/electronics teachers often absent themselves from classes due to inadequate instructional materials and facilities.	19 76	27 81	10 20	- -	3.16	0.71	Agreed
12	Inadequate instructional materials and facilities are the chief causes of brain drain among technology and vocational education teachers	24 96	30 90	2 4	- -	3.36	0.56	Agreed
13	Electrical/electronics teachers show different manners of negative attitude to work due to inadequate instructional materials and facilities	21 84	20 60	15 30	- -	3.12	0.80	Agreed
14	Inadequate instructional materials and facilities reduce electrical/electronics teacher's zeal and interest in electrical/electronic teaching.	38 152	10 30	7 14	1 1	3.52	0.79	Agreed
15	Electrical/electronics qualified teachers often abandon their profession to run political errands or join politics fully due to inadequate instructional facilities and materials.	40 160	15 45	1 2	- -	3.70	0.50	Agreed
16	It hinders the capture and retention of students attention.	24 96	30 90	1 2	1 1	3.38	0.56	Agreed

N = 56; Decision cut off point = 2.5

Research Question 2:

What are the influences of inadequate instructional materials and facilities on students' effective learning of E/E

technology education courses?

Table 2
Mean and Standard Deviation of Responses on the Influence of Inadequate Instructional Materials and Facilities on Students' Effective Learning of Electrical and Electronics Courses.

S/N	ITEMS	SA	A	D	SD	X	Std	Decision
1	Inadequate instructional materials and facilities reduce student interest in electrical/electronics lectures and learning	45 180	9 27	2 4	- -	3.77	0.50	Agreed
2	Inadequate instructional materials and facilities hinder students participation in electrical/electronics lecturers and instruction.	31 124	18 54	7 14	- -	3.43	0.71	Agreed
3	Inadequate instructional materials and facilities make students truancy in E/E lessons to increase	36 144	7 21	9 18	4 4	3.34	1.00	Agreed
4	Inadequate instructional materials and facilities make E/E learning abstract and theoretical.	33 132	10 30	8 16	5 5	3.27	1.02	Agreed
5	Inadequate instructional materials and facilities deprive concreteness and vivid experiences from E/E learning.	18 72	27 81	6 12	5 5	3.04	0.89	Agreed
6	Inadequate instructional materials and facilities hinder various classroom interaction patterns possible in E/E learning.	38 152	10 30	7 14	1 1	3.52	0.79	Agreed
7	Inadequate instructional materials and facilities make students to hate both E/E courses and their teachers.	20 80	15 45	10 20	11 11	2.79	1.14	Agreed
8	Inadequate instructional materials and facilities hinder the capture and retention of student attention while learning E/E courses.	21 84	20 60	15 30	- -	3.11	0.80	Agreed
9	Inadequate instructional materials and facilities hinder the attractiveness of E/E courses and their learning experiences to students.	29 116	14 42	10 20	3 3	3.23	0.93	Agreed
10	Inadequate instructional materials and facilities increase students negative attitude toward E/E courses.	24 96	30 90	2 4	- -	3.39	0.56	Agreed
11	Inadequate instructional materials and facilities encourage and enhance student absence from E/E lessons.	22 88	10 30	5 12	18 18	2.64	1.30	Agreed
12	Inadequate instructional materials and facilities jointly hinder students practical skills acquisition in E/E courses.	19 76	27 81	10 20	- -	3.16	0.71	Agreed
13	Inadequate instructional materials and facilities reduce students' scores in continuous assessment in E/E courses	30 120	16 48	7 14	3 3	3.31	0.89	Agreed
14	Inadequate instructional materials and facilities jointly reduce students score on semester exams in E/E courses.	40 160	15 45	1 2	- -	3.70	0.50	Agreed
15	Inadequate instructional materials and facilities jointly reduce students CGPA on graduation from E/E programme.	36 144	16 48	4 8	- -	3.57	0.63	Agreed
16	Inadequate instructional materials and facilities hinder students acquisition of specialized practical skills in oscilloscope, signal generator, yagiuda antenna, wave guides and electromagnetic wave propagation/mentoring skills	31 124	18 54	7 14	- -	3.43	0.71	Agreed

N = 56; Decision cut off point = 2.5

Testing Of Hypotheses

Hypothesis 1

HO_1: There will be no statistical significant difference between the responses of teachers and those of students on the influences of inadequate instructional materials and facilities on the effective teaching of electrical and electronics technology education courses.

Table 3

Two Tailed T-Test of Difference Between the Mean Responses of Teachers and Students on the Influences of Inadequate Instructional Materials and Facilities on the Effective Teaching of Electrical and Electronics Technology Education Courses.

S/N	ITEMS	$\overline{X}_T$	$\overline{X}_S$	T-CAL	REMARK
1	Inadequate instructional materials and facilities make electrical and electronics teachers to dispate a lot of energy during lesson delivery without achieving much.	3.01	3.61	0.67	NS
2	Inadequate instructional materials and facilities cause a lot of discouragement on electrical and electronics teachers.	2.41	3.51	0.84	NS
3	Inadequate instructional materials and facilities hinder concrete technical instruction.	3.47	3.29	0.18	NS
4	Inadequate instructional materials and facilities make teachers not to feel energized to teach well.	3.69	3.45	0.38	NS
5	Inadequate instructional material and facilities make electrical/electronics teacher rely on abstract and theoretical teaching.	3.91	2.73	0.99	NS
6	Inadequate instructional materials and facilities reduce teacher's motivation to teach well.	3.91	2.71	1.35	NS
7	Effective teaching is hindered by inadequate instructional materials and facilities.	2.73	2.55	0.14	NS
8	Electrical/electronics teacher's time are wasted due to inadequate instructional materials and facilities.	3.522	2.94	0.62	NS
9	Electrical/electronics teachers use lecture methods only due to inadequate instructional materials and facilities.	3.02	2.56	0.41	NS
10	Inadequate instructional materials and facilities make teaching electrical/electronics exercise very boring to teachers.	3.33	2.75	0.65	NS
11	Electrical/electronics teachers often absent themselves from classes due to inadequate instructional materials and facilities.	3.26	3.06	0.22	NS
12	Inadequate instructional materials and facilities are the chief causes of brain drain among technology and vocational education teachers.	3.80	2.92	1.57	NS
13	Electrical/electronics teachers show different manners of negative attitude to work due to inadequate instructional materials and facilities.	3.10	3.14	0.50	NS
14	Inadequate instructional materials and facilities reduce electrical/electronics teacher's zeal and interest in electrical/electronics teaching.	3.64	3.40	0.31	NS
15	Electrical/electronics qualified teachers often abandon their profession to run political errands or join politics fully due to inadequate instructional facilities and materials.	3.45	3.95	1.11	NS
16	It hinders the capture and retention of students attention.	3.62	3.14	0.86	NS

Hypothesis 2

HO_2: There will be no statistical significant difference between the responses of teachers and those of students on the influences of inadequate instructional materials and facilities on the effective learning of electrical and electronics technology education courses.

Table 4
Two-Tailed T-test of Difference Between the Mean Responses of Teachers and Students on the Influences of Inadequate Instructional Materials and Facilities on the Effective Learning of Electrical and Electronics Technology Education

S/N	ITEMS	$\bar{X}_T$	$\bar{X}_S$	T-CAL	REMARK
1	Inadequate instructional materials and facilities reduce student interest in electrical/electronics lectures and learning	3.88	3.66	0.44	NS
2	Inadequate instructional materials and facilities hinder students participation in electrical/electronics lecturers and instruction.	3.61	3.25	0.97	NS
3	Inadequate instructional materials and facilities make students truancy in E/E lessons to increase	3.54	3.14	0.40	NS
4	Inadequate instructional materials and facilities make E/E learning abstract and theoretical.	3.49	3.05	0.43	NS
5	Inadequate instructional materials and facilities deprive concreteness and vivid experiences from E/E learning.	3.17	2.91	0.32	NS
6	Inadequate instructional materials and facilities hinder various classroom interaction patterns possible in E/E learning.	3.76	3.28	0.61	NS
7	Inadequate instructional materials and facilities make students to hate both E/E courses and their teachers.	2.99	2.59	0.35	NS
8	Inadequate instructional materials and facilities hinder the capture and retention of student attention while learning E/E courses.	3.44	2.78	0.83	NS
9	Inadequate instructional materials and facilities hinder the attractiveness of E/E courses and their learning experiences to students.	3.78	2.68	1.18	NS
10	Inadequate instructional materials and facilities increase students negative attitude toward E/E courses.	3.88	2.90	1.75	NS
11	Inadequate instructional materials and facilities encourage and enhance student absence from E/E lessons.	3.11	2.17	0.72	NS
12	Inadequate instructional materials and facilities jointly hinder students' practical skills acquisition in E/E courses.	2.97	3.35	0.54	NS
13	Inadequate instructional materials and facilities reduce students' scores in continuous assessment in E/E courses	3.33	3.29	0045	NS
14	Inadequate instructional materials and facilities jointly reduce students score on semester exams in E/E courses.	3.84	3.56	0.56	NS
15	Inadequate instructional materials and facilities jointly reduce students CGPA on graduation from E/E programme.	3.66	3.48	0.29	NS
16	Inadequate instructional materials and facilities hinder students acquisition of specialized practical skills in oscilloscope, signal generator, yagi-uda antenna, wave guides and electromagnetic wave propagation/mentoring skills	3.82	3.04	1.18	NS

Key:
X_T = Mean for teachers responses (N_T=6)
X_S = Mean for students responses (Ns=50)
DF = Degree of Freedom = 54 (N_T+N_S-2)
P = Level of significance = 0.05
T-table = critical t-value in the table = 2.01 (Two-tailed)
S = Significant difference in mean
NS = No Significant difference in mean

Findings of the Study

Based on the data collected and analyzed as shown above, the following findings were made in this study.

1. Inadequate instructional materials and facilities make electrical/electronics teachers to dispate a lot of energy during lesson delivery without achieving much (x = 3.31, t-cal = 0.67.
2. Inadequate instructional materials and facilities hinder concrete technical instruction by teachers (x = 3.38, d = 0.18)
3. Inadequate instructional materials and facilities hinder the effective teaching of electrical/electronic courses.
4. Inadequate instructional materials and facilities make the teaching of electrical/electronics courses very boring, abstract and theoretical.
5. Inadequate instructional materials and facilities reduce electrical/electronics teachers zeal and interest in teaching (x = 3.52, t=0.31).
6. Inadequate instructional materials and facilities reduce students interest and zeal in electrical/electronics lectures and learning (x = 3.77; t = 0.44).
7. Inadequate instructional materials and facilities hinder students' participation in electrical/electronics lecturers and instruction (x = 3043; t=0.97).
8. Inadequate instructional materials and facilities hinder various classroom interaction patterns possible in electrical/electronics learning (x = 3.52; t = 0.61).
9. Inadequate instruction materials and facilities jointly hinder students practical skills acquisition in electrical/electronics courses (x = 3.52; t=0.54)
10. Inadequate instructional materials and facilities jointly reduce students score in electrical/electronics semester examinations and CGPA on graduation (x = 3.70' t = 0.50)

Discussion

This study generally indicated 32 classified influences of inadequate instructional materials and facilities but only 10 critical ones were outlined under the findings of the study subheading. From the analysis tables presented, it is clear that all the teachers and students agreed to the fact that all 32 items generally influence the teaching and learning of electrical/electronics (E/E) courses negatively. In the same vain, there was no significant difference between the responses of teachers and those of students as shown in t-test tables 3 & 4. Both of them agreed that the use of inadequate instructional materials and facilities greatly effect students' skill acquisition in electrical/electronics. This is in line with Ogwa (2008) who stated that technology and vocational educators require teaching aids to specifically help students acquire the necessary skills in their subject area.

They also agreed that the use of inadequate instructional materials and facilities effect teachers motivation in teaching electrical/electronics technology education courses . Blasé (1994) state that when adequate instructional materials are provided to the teachers, they feel energized and motivated and their sense of ownership and empowerment increased. Well implemented school improvement plans on the use of instructional materials and facilities in teaching and learning of electrical/electronics can incrase collegiality and give teachers the satisfaction to committing themselves to school improvement goals. According to Eya (2006) instructional materials make the teachers' job easier, faster and more effective. Eya maintained that when a teacher sees that he has relevant materials to teach his subject, he becomes more eager to go and teach.

Academic performance according to Bossaert et al (2011) is the outcome of education showing the extent to which a student, teachers or institutions have achieved their educational goals. Academic performance generally refers to how well a student is accomplishing his or her tasks and studies. This can be measured with the permanent changes in the behaviour of a student as a result of the knowledge acquired. This is in line with Tomporowsk et al (2008) who wrote that the purpose of learning is to effect a permanent change in behaviour of the learner. Therefore, the sole aim of teaching is to gain experience. This emphasizes that when instructional materials and facilities are used in teaching and learning of electrical/electronics, the academic performance of the students will be improved. This is in line with items 12, 13, 14, 15 and 16 of table 2 which revealed that use of inadequate instructional materials and facilities reduce the academic performance of students in electrical/electronics and hinder practical skills acquisition in electrical/ electronic courses. Items 1,2 and 3 of table 2 revealed that inadequate instructional materials and facilities hinder the interest of the students in teaching and learning of electrical/electronics hinder their participation in electrical/electronic lectures and increase students truancy. Interest and ability should determine the individuals directions in education. In electrical/electronics technology education, interest becomes driving force to achieve the desired goals. If student's interest can be generated in the lesson all the attention can be focused on areas learned. But if the students do not have the interest or lack attention to a lesson, it can also influence the interest of the teachers thereby affecting the variety of ways or methods of teaching, hence they cannot achieve the expected learning objective. FRN (2004) specifically stated that instructional materials and facilities arouse the interest of students in the teaching and learning technical subjects. Mbaga, Quahha and Duhu (2014) stated that it is only a well-

developed instructional system headed by the teacher and assisted by adequate instructional materials and facilities that can positively influence the production of high caliber graduates at all levels of educational system. In the same vein Ogbu (2014) greatly emphasized the importance of adequate, effective and efficient instructional materials and facilities in technology and vocational education, if wastages must be curbed in TVET.

Conclusion

This study investigated the influences of inadequate instructional materials and facilities in the teaching and learning of electrical/electronics technology education courses. Unfortunately the scope of this study did not cover the provision of solution to all these obvious negative influences. At any rate, the study uncovered most of the influences of inadequate instructional materials and facilities numbering up to 32.

The conclusion drawn is that the influences of inadequate instructional materials and facilities are usually caped by undue students' low academic performance in continuous assessment score, low semester examination scores, grossly poor graduating CGPA and very low practical skill acquisition.

Recommendations

Based on the findings of this study the following recommendations were made.

1. That government and E/E programme proprietors should provide instructional materials and facilities adequately to prevent all the negative influences of inadequate instructional materials and facilities to effective teaching of Electrical/electronics courses.
2. That all concerned should join hands to adequately provide instructional materials and facilities in other to eradicate their negative influences on the effective learning and practical skill acquisition in E/E courses.

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