

IMPEDIMENTS TO EFFECTIVE IMPROVISATION OF INSTRUCTIONAL MATERIALS FOR TEACHING ELECTRICAL INSTALLATION WORKS IN EBONYI STATE TECHNICAL COLLEGES

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ABSTRACT: *This study investigated the impediments to effective improvisation of instructional materials for teaching Electrical Installation Works (EIW) in Ebonyi State Technical Colleges. Two research questions and two hypotheses guided the study. Survey research design was adopted for the study with a population of 192. Sampling was not carried out because the population was manageable. Thirty item structured questionnaire was the instrument used for data collection. Three experts established the face validity of the instrument while 0.95 was its reliability coefficient obtained through test-re-test method with Pearson Product Moment Correlation to ensure its measures of stability. Mean and standard deviation were used to answer the research questions while students t-test statistic was used to test the hypotheses at 0.05 level of significance. The findings revealed thirteen critical impediments resulting from EIW teachers' characteristics and seventeen critical impediments due to environmental and situation forces surrounding EIW programme implementation. It was then recommended that Ebonyi State Government should ameliorate these impediments urgently to forestall their consequences.*

KEYWORDS: Impediment, Effective, Improvisation, Electrical, Installation work, Teaching, Technical College.

INTRODUCTION

Wikipedia (2014) defined improvisation as the process of making or doing something using whatever equipment or material resource that is presently available simply because the originally expected material resources are not available. Hornby (2015) in his own view defined improvisation as the act of making something or inventing it as one goes on, being guided only by imagination, instinct and guesswork rather than by a careful plan. These are two broad perspectives whereby improvisation can be viewed and defined. In the context of technology and vocational education teaching and learning processes, improvisation can be defined as the process of producing entirely new instructional material, tool, instrument or equipment from locally available materials and using same to teach the concerned technology content effectively. It may involve modifying the existing prototype or model to suit the topic at hand which there is no suitable teaching aid. In general, the newly produced instructional material or the modified prototype are called the improvise of the usually imported original model or standard materials that are not available.

Other experts such as Akude (2010) and Balogun (1982) stated that improvisation is the act of using alternative materials and resources to facilitate instruction whenever there is shortage or total absence of original imported teaching aids. For technology teachers, improvisation directly means the construction of simple instructional materials, equipment and instruments

critically needed to make teaching and learning processes easier and interesting, since in most cases the original prototypes and models for teaching are never available. Improvisation is the actual representation of scientific concepts through the use of non-conventional local materials, the target being to achieve fully the instructional objectives.

Ofoefuna (1999) stated that there are two main types of improvisation, viz: (i) improvisation by substitution whereby an already existing local material is used in place of the equipment that is not available, (ii) improvisation by construction whereby the teacher constructs a new material to teach his lesson when the required original imported model of the equipment or material are not available. In technology and vocational education (TVE) teaching and learning, the above two types of instructional materials improvisation are concurrently employed because of the dear dearth of instructional materials necessary for effective teaching. Without adequate supply, availability and utilization of functional instructional material, TVE teaching and learning will be devoid of practical reality and effectiveness.

According to Olaitan (1996) instructional materials are devices, machines, instruments, equipment, graphic representations and audio systems that help to facilitate teaching and learning. They generally bring reality into the classroom or workshop thereby boosting the interest of students to learn technical content. One of the subjects taught in Nigerian technical colleges that has tasking technical content is Electrical Installation Work (EIW) whereby the trade theory and practical electric circuit wiring practice are the major technical contents. The technical contents of electrical installation work are highly abstract and impossible to teach without appropriate instructional material. Hence instructional material improvisation is inevitable if electrical installation work must be taught in Nigerian Technical colleges considering the true economic reality in the country. Hence effective teaching of electrical installation work demands effective improvisation of diverse types of instructional material resources. It was for this reason that Ashley (2004) warned that teachers should not use any excuse to resort to poor teaching, instead they should learn to improvise diverse instructional materials against all odds and impediments. Hornby (2015) defined impediment as obstruction, obstacle or hindrance that delays or stops progress of something, an art or an action. Impediment is therefore any force or phenomenon that lowers, reduces or puts to an end the expected pace of any event or activity. Impediment could equally be occasioned by prevailing situation circumstance, or even personal disposition and potentials which the actor or actors find themselves. For example, if a technical teacher has an inherently poor intellectual disposition, his resourcefulness and ability to improvise instructional material may be grossly hindered.

The problem of this study is that presently, there is no empirical evidence on the various impediments to effective improvisation of instructional materials, machines and equipment for the effective teaching of electrical installation work (EIW) by teachers in Ebonyi State technical colleges. Due to lack of original instructional materials and inability of teachers to improvise with locally available materials, there had been very poor and grossly ineffective teaching of electrical installation work (EIW). The resultant effect of all these poor and ineffective teaching had been persistent poor academic performance of students in electrical installation work (EIW) at both internal and external examinations. This is a very serious source of worry nationally because of its multiplier effects on higher education, technological development and the general society.

The general purpose of this study was to investigate the impediments to effective improvisation of instructional materials, machines and equipment for the effective teaching of electrical

installation work (EIW) in Ebonyi State Technical Colleges. This study will be significant because it will bring to bare all the critical impediments to effective improvisation of electrical installation work (EIW) instructional materials which will enable government, professionals and school authorities to provide immediate solution to the problem and its consequences

Research Questions

The following research questions were formulated to guide this study:

1. What are the impediments to effective improvisation of EIW instructional materials resulting from the teachers characteristics?
2. What are EIW environmental and situational impediments to effective improvisation of instructional materials?

Hypotheses

H₀₁: There will be no statistical significant difference between the mean responses of teachers and students on the EIW teachers characteristics that impeded effective improvisation of instructional materials.

H₀₂: The mean responses of teachers and students on EIW environmental and situational impediments to effective improvisation of instructional materials will not be statistically significant.

METHODOLOGY

This study adopted survey research design with a total population of 192 comprising 8 teachers and 184 students (EIW SS2 & SS3). The population was the enumeration of EIW teachers and students from GTC Abakaliki 3 teachers and 65 students; Ehugbo Technical college 3 teachers and 69 students; and Folk technical college 2 teachers and 59 students. EIW SS1 Students were not included because they may not know much about the study. Sampling was not carried out because the population was manageable. The instrument used for data collection was a structured questionnaire developed by the researcher using a four-point response scale of strongly Agree (4), Agree (3) Disagree (2) and Strongly Disagree (1). Face validity of the instrument was established by three experts: Two from TVE Department and one from measurement and evaluation unit of science Education Department of Ebonyi State University. Measures of stability reliability of the instrument was established through the test re-test method with Pearson Product Moment Correlation computation which yielded 0.95 correlation coefficient which was considered adequate for the study.

The instrument was administered by hand with the aid of three research assistants, one per technical college and retrieved immediately after completion by the respondents, ensuring 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. Decision rules: Any item that had a mean response of 2.5 and above is agreed to while items with mean response below 2.5 is disagreed to.

RESULTS

The results of the data analysis are presented in the tables below in line with the research questions and hypothesis.

Research Question 1

What are the impediments to effective improvisation of EIW instructional materials resulting from the teachers' characteristics?

Table 1: Mean and Standard Deviation of Responses on the Impediments to Effective Improvisation of EIW Instructional Materials Resulting from the Teachers' Characteristics.

S/N	Item statement	\bar{X}	Std	Remarks
1	Unqualified EIW teachers lack the ability to improvise any instructional material.	2.81	1.14	Agree
2	EIW teacher preparation lacked improvisation content in its curriculum, rendering them impotent in improvisation.	3.06	0.59	Agree
3	Teachers lack of creativity impedes instructional materials improvisation.	3.17	1.16	Agree
4	Most of the teachers are not resourceful enough to undertake instructional materials improvisation.	2.54	1.02	Agree
5	Incompetence among EIW teachers is a serious impediment to instructional materials improvisation.	2.83	1.05	Agree
6	Non-chalant attitude of EIW teachers hinders improvisation.	2.99	0.94	Agree
7	Low level of interest on their job hinders improvisation.	2.62	1.12	Agree
8	Poor aptitude of teachers to EIW technical/engineering content impedes improvisation.	3.08	1.05	Agree
9	Poor EIW instrumentation skills among teachers impede improvisation.	2.89	0.72	Agree
10	Non-interactive teaching styles of EIW teachers negate improvisation ideology and intent.	3.63	1.04	Agree
11	Lack of electrical engineering process skills among EIW teachers hinder instructional material improvisation.	2.73	0.78	Agree
12	Lack of teachers interest in EIW conference attendance hinders instructional material improvisation.	3.20	1.16	Agreed
13	Negative self-concept of EIW teachers hinders instructional material improvisation	2.89	1.06	Agree

Research question 2

What are the EIW environmental and situational impediments to effective improvisation of instructional materials?

Table 2: Mean and Standard Deviation of Responses on the Environmental and Situational Impediments to Effective Improvisation of Instructional Materials.

S/N	Item statement	\bar{X}	Std	Remarks
14	Epileptic electric power supply is one of the environmental impediments to effective improvisation of EIW instructional materials.	3.41	1.13	Agree
15	Lack of alternative energy sources for EIW workshops and laboratories hinder improvisation.	2.87	0.91	Agree
16	General power systems failure in Nigeria impedes all improvisation efforts.	3.54	0.79	Agree
17	Unsafe classrooms and lecturer theaters hinder effective improvisation of EIW instructional materials.	3.52	0.87	Agree
18	Unsafe workshops and laboratories impede effective improvisation of EIW instructional materials.	3.62	1.22	Agree
19	Destruction of few improvised materials by high voltage surges and spikes impede effective improvisation of EIW instructional materials.	3.36	0.81	Agree
20	Insectant physiological effects of electric current due to unearthed and unprotected metal works impede effective improvisation of instructional materials.	3.69	1.09	Agree
21	Lack of fund to enhance improvisation activities is a very serious impediment.	2.73	1.12	Agree
22	Inadequate fund to pay staff and external experts impedes improvisation.	3.32	0.77	Agree
23	Prevailing negative reward system in Nigeria discourages the spirit of improvisation among staff.	2.53	1.26	Agree
24	Lack of storage facilities impedes improvisation.	3.31	0.68	Agree
25	Poor government attitude toward technical education in Nigeria is an impediment to EIW instructional materials improvisation.	3.54	1.21	Agreed
26	EIW instructional materials improvisation is hindered by corruption at high and low places in Nigeria.	3.62	1.17	Agree
27	EIW administrator's inability to supervise and encourage improvisation activities is an impediment.	2.79	0.99	Agree
28	Lack of efficient ICT and internet services in colleges are impediment.	2.97	0.71	Agree
29	Low ICT skills among EIW personnel hinders improvisation of instructional materials.	3.02	1.06	Agree
30	Lack of local substitutes of EIW materials in the Environment is a serious impediment.	3.39	1.01	agree

Hypothesis 1

There will be no statistical significant difference between the mean responses of teachers and students on the EIW teachers' characteristics that impede effective improvisation of instructional materials.

Table 3: Two-tailed t-test of Difference Between the Mean Responses of EIW Teachers and Students on the EIW Teachers Characteristics that Impede Effective Improvisation of Instructional Materials.

S/N	Item statement	\bar{X}_T	\bar{X}_S	t-cal	Remarks
1	Unqualified EIW teachers lack the ability to improvise any instructional material.	2.88	2.74	0.56	NS
2	EIW teacher preparation lacked improvisation content in its curriculum, rendering them impotent in improvisation.	3.14	2.97	0.59	NS
3	Teachers lack of creativity impedes instructional materials improvisation.	3.33	3.01	0.88	NS
4	Most of the teachers are not resourceful enough to undertake instructional materials improvisation.	2.44	2.64	0.62	NS
5	Incompetence among EIW teachers is a serious impediment to instructional materials improvisation.	3.21	2.44	1.66	NS
6	Non-chalant attitude of EIW teachers hinders improvisation.	2.87	3.11	0.68	NS
7	Low level of interest on their job hinders improvisation.	2.69	2.55	0.56	NS
8	Poor aptitude of teachers to EIW technical/engineering content impedes improvisation.	3.10	2.98	0.54	NS
9	Poor EIW instrumentation skills among teachers impede improvisation.	2.91	2.88	0.47	NS
10	Non-interactive teaching styles of EIW teachers negate improvisation ideology.	3.67	3.59	0.48	NS
11	Lack of electrical engineering process skills among EIW teacher hinder instructional material improvisation.	2.07	3.38	2.54	S
12	Lack of teachers interest in EIW conference attendance hinders instructional material improvisation.	3.52	2.88	1.41	NS
13	Negative self-concept of EIW teachers hinders instructional material improvisation	2.47	3.32	1.87	NS

Key: \bar{X}_T = Mean response for EIW teachers ($N_T = 8$)
 \bar{X}_S = mean response for students ($N_S = 184$)
Df = Degree of freedom ($N_T + N_S - 2$) = 190
t-table = 1.96 for two-tail @ Df >100 and $p < 0.05$
t-cal = calculated t-value
Ns = No significant difference in means
S = Significant difference in means

Hypothesis 2

The mean responses of teachers and students on EIW environmental and situational impediments to effective improvisation of instructional materials will not be statistically significant.

The result of H_{02} test is presented in table 4 below

Table 4: Two-tailed t-test of Difference Between the Mean Responses of EIW Teachers and Students on the EIW Environmental and Situational Impediments to Effective Improvisation of Instructional Materials.

S/N	Item statement	\bar{X}_T	\bar{X}_S	t-cal	Remarks
14	Epileptic electric power supply is one of the environmental impediments to effective improvisation of EIW instructional materials.	3.44	3.38	0.49	NS
15	Lack of alternative energy sources for EIW workshops and laboratories hinder improvisation.	2.64	3.10	1.13	NS
16	General power systems failure in Nigeria impedes all improvisation efforts.	3.43	3.64	0.61	NS
17	Unsafe classrooms and lecturer theaters hinder effective improvisation of EIW instructional materials.	3.41	3.63	0.63	NS
18	Unsafe workshops and laboratories impede effective improvisation of EIW instructional materials.	3.66	3.58	0.49	NS
19	Destruction of few improvised materials by high voltage surges and spikes impede effective improvisation of EIW instructional materials.	3.04	3.68	1.49	NS
20	Incessant physiological effects of electric current due to unearthed and unprotected metal works impede effective improvisation of instructional materials.	3.74	3.65	0.51	NS
21	Lack of fund to enhance improvisation activities is a very serious impediment.	2.77	2.68	0.69	NS
22	Inadequate fund to pay staff and external experts impedes improvisation.	3.40	3.24	0.88	NS
23	Prevailing negative reward system in Nigeria discourages the spirit of improvisation among staff.	3.01	2.05	2.98	S
24	Lack of storage facilities impedes improvisation.	3.32	3.30	0.66	NS
25	Poor government attitude toward technical education in Nigeria is an impediment to EIW instructional materials improvisation.	3.64	3.44	0.73	NS

26	EIW instructional materials improvisation is hindered by corruption at high and low places in Nigeria.	3.78	3.46	1.01	NS
27	EIW administrator's inability to supervise and encourage improvisation activities is an impediment.	3.21	2.98	1.02	NS
28	Lack of efficient ICT and internet services in colleges are impediment.	3.08	2.86	1.03	NS
29	Low ICT skills among EIW personnel hinders improvisation of instructional materials.	3.10	2.94	0.87	NS
30	Lack of local substitutes of EIW materials in the Environment is a serious impediment.	3.52	3.26	1.05	NS

Key: (key under table 3 applies)

Summary of findings

Based on the analyzed data, the findings made in this study were summarized as follows:

1. Thirteen impediments to effective improvisation due to teachers' characteristics were found
2. Seventeen impediments to effective improvisation were found due to EIW environmental and situational factors.

DISCUSSION

The findings of this study revealed thirteen critical impediments to effective improvisation of EIW instructional materials caused by teachers' characteristics. Principal among these impediments is teachers' non-interactive teaching styles which consistently negate improvisation ideology and intent. This impediment was presented in item 10 of Table 1 with the highest mean of 3.63 and standard deviation of 1.04. This finding agrees with Ogbu (2011) who emphasized that non-interactive teaching styles of Basic Electricity Teachers hinders cognitive achievement in Basic electricity and also impede improvisation of instructional materials. When teachers employ non-interactive teaching styles, the need for instructional materials are totally forgotten because they will assume that all is well. Non-interactive teaching style by implication and cause is a summative impediment caused by teacher characteristics (Ogbu, 2009, 2010, 2011, 2012 and 2014).

The findings also revealed seventeen critical impediments to effective improvisation of EIW instructional materials that were caused by environments and situations surrounding EIW programme implementation. In this group of findings, impediments caused by inescapable physiological effects of electric current was prominent with mean of 3.69 and a standard deviation of 1.09 as presented in Table 2 item number 20. Though lack of fund to enhance improvisation activities has low mean of 2.73 and standard deviation of 1.12, yet many experts believe that it had always been a critical impediment (Alumode, 2006; Aduhuekwe, 2004; Obi, 1995; and Nwafor & Igwe, 2008).

Another very critical impediment under environmental and situational umbrella is the prevailing negative reward system in Nigeria which discourages the spirit of improvisation among teachers and other support staff. Each of the itemized environmental and situational impediment contribute in one way or the other in reducing EIW instructional materials improvisation, thereby reducing the overall provision and availability of instructional materials which in turn lead to poor students achievement in EIW due to ineffective teaching and learning.

CONCLUSION

This study had effectively investigated the impediments to effective improvisation of EIW instructional materials. The study revealed that the impediments can be grouped into two, viz: those emanating from EIW teachers' characteristics and those caused by environmental and situational forces surrounding EIW programme implementation. Based on the findings of the study, it can be concluded that none of the impediments should be allowed to continue to exist because of their inherent threat to effective study of EIW in Ebonyi State of Nigeria.

RECOMMENDATION

Based on the findings of this study, the following recommendations were made:

1. Ebonyi State Government should train and re-train EIW teachers to equip them with intellectual and emotional characteristics to effectively improvise EIW instructional materials.
2. Ebonyi State Government and all concerned individuals should provide enabling environment for effective improvisation of EIW instructional materials.

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