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AVAILABILITY AND UTILIZATION OF INSTRUCTIONAL FACILITIES FOR THE TEACHING OF BASIC ELECTRICITY IN EBONYI STATE TECHNICAL COLLEGES

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ABSTRACT: *This study investigated the availability and utilization of instructional facilities and material for the effective teaching of Basic Electricity in Ebonyi State technical colleges. Two research questions and one hypothesis guided the study. It was a survey research design and the entire population of Basic Electricity technical teachers together with their SSII and SSIII students with a total of 150 were used. Due to this size of the population no sampling was carried out. Instrument for data collection was a structured and validated questionnaire with a reliability coefficient of stability 0.86. The questionnaire were distributed by hand and also collected back after completion with the help of three research assistants. Frequency counts and percentages were used to answer research question one while mean ratings were used to answer the second research question. The hypothesis was tested with t-test statistics. The findings revealed that many vital facilities and materials are not available while some available ones are not even effectively utilized for the teaching of Basic electricity. It was therefore recommended that all stake-holders should contribute financially and materially to enhance the effective teaching of basic electricity.*

KEYWORDS: *Basic electricity, instructional materials, teaching, availability, utilization.*

Introduction

The quality of education and training given to youths depends greatly on the ability of institutions to adjust their educational content to the changing skill requirements of the nation. In other words, educational institutions are expected to provide knowledge and training that satisfies the human resource demands of the nation and the nation's economy (Mayindo, 1995). This is especially true of training in strategic occupation that are rapidly changing with the advent of new technologies. Institutional training should aim to equip students with useful skills and to improve their knowledge and capabilities in their chosen field such as basic electricity. Basic electricity is one of the technical college subjects taught in years I, II and III as stipulated by the national policy on education (FRN, 2004). The areas covered in these courses include electrical installation, cable joining, battery charging and the winding of electrical machines. The realization of the objectives of technical college electricity programmes and their ability to improve student achievement depends on a number of factors. These include the availability of equipment, tools and materials, an adequate supply of technical education teachers, and the proper implementation and usage of technical equipment, tools and materials (Umunadi, 2004).

Awobodu (2000), noted that teacher utilization of relevant equipment, materials and tools in teaching basic electricity facilitates learning and enhances students' achievement. The usefulness of any available instructional facilities depend on what the teacher makes out of it, as they do not achieve any of the attributed values on their own. Qualified teachers with saleable and employable skills as well as knowledge for impacting skills and theories to others are necessary to

ensure the implementation of the new curriculum in the technical colleges introduced recently by the National Board for Technical Education. Ezeji (1993), highlighted that teachers' utterances, actions, leadership styles, knowledge of the subject and skills in teaching were all considered important factors in student learning. That is, acquisition of the knowledge needed for effective utilization of basic electricity equipment available during teacher training will help teachers to subsequently impart knowledge in their implementation of the curriculum.

Therefore, availability is the degree to which facilities, service, or functional materials are provided and made ready for use. Availability of instructional facilities is a holistic term which is directed toward education as an entity. Utilization of instructional facilities is the process of using procured and accessible facilities tools, components equipment and appliances to make teaching and learning process easier, interesting and rewarding. Aromolara (1985), noted that lack of materials and equipment had been significant problems in the Nigerian education system. The school system is also characterized by the rigidities of centralized curriculum and a lack of human resources both of which restrict institutions from attempting more innovations and flexible approaches so as to equip students with skills to succeed at a time of rapid curriculum change in science and technology. The practice of starving schools of equipment and funds need to cease (Nwana, 1983).

Many countries are described as developed today because of their technological advancements and innovations. In Nigeria, the inadequacy of qualified technical teachers is one factors that is militating against a boost in technological manpower. Ogunnowo (1992), Olaitain (1987)and Aina (2000) all admitted that there is a problem of inadequate qualified technical teachers at almost all levels and types of education in Nigeria resulting to the poor utilization of the few available facilities and instructional materials.

A visit to some technical colleges which are regarded as principal vocational institutions, intended to boost the technological manpower in the state, the researcher observed that they lacked adequate instructional facilities and had inefficient qualified teachers who teach basic electricity.Fafunwa, (1999) asserted that no adequate training could take place without competent teachers to handle it and adequate materials for instructions. Haruna (2010) maintained that a competent teacher is flexible in the utilization of instructional materials, methods, strategies, styles and delivery. He further stated that the ability of the teacher to communicate effectively with the students alsofacilitates teaching competency and learning.

The problem of this study was that the researcher suspected inadequate instructional materials and poor utilization of physical and workshop facilities available for teaching basic electricity in technical colleges which led to student failure and lack of competencies in the field of study. This necessitated this study which investigated the availability and utilization of instructional facilities in the teaching and learning of basic electricity in Ebonyi State Technical colleges.

Hence, the major purpose of this study is to determine the availability and utilization of instructional facilities necessary for effective teaching of basic electricity in Ebonyi State technical colleges.

Research Questions

The following research questions were formulated to guide this study:

1. What are the available instructional facilities for effective teaching of basic electricity in Ebonyi State technical colleges?
2. How often are the available instructional facilities and materials utilized for effective teaching of basic electric in Ebonyi State Technical Colleges?

Hypothesis

There will be no statistical significant difference between the mean responses of basic electricity technical teachers and those of Basic Electricity students on how often available instructional facilities and materials are utilized for effective teaching of Basic electricity.

Methodology

Survey research design was adopted with total population of 150 being an enumeration of all the Basic Electricity teachers together with SSII and SSIII Basic Electricity Students in Ebonyi State Technical Colleges. The distribution of the population among the three technical colleges in Ebonyi State are as follows: three basic electricity teachers, twenty SSII and twenty SSIII students were from Government Technical College Abakaliki; two teachers, 22 SSII and twenty SSIII students were from Folk Technical Colleges Ikwo; while three teachers, 34 SSII and 26 SSIII students were from Ehugbo Technical College, Afikpo. The whole population of 150 were used for the study, no sampling was carried out.

The instrument used for data collection was structured questionnaire having two sections. Section A meant to collect data needed for research question one had a list of required instructional facilities and materials with column for the response on the available number with their percentages. Section B meant to collect data needed for research question two had four point scale of: Always utilized (AU) = 4 points; sometime utilized (SU) = 3 points; rarely utilized (RU) = 2 points and Never utilized (NU) = 1 point. The instrument was validated and the computed reliability of its trial test was 0.85 being its measure of stability.

The instrument was administered by hand with the, help of three research assistants. All the 150 copies of the questionnaire were correctly completed and returned, representing 100% return. Percentage count was used to answer research question one, mean rating was used to answer research question two while t-test was used to test the hypothesis at 0.05 level of significance.

Results

Research Question 1

What are the available workshop facilities for the effective teaching of basic electricity?

Table 1:

Frequency Count and Percentage of the Availability of Workshop Facilities and Materials for Teaching Basic Electricity

S/N	ITEMS	Workshop facility		
		SEB-min. standard	Available at school	Percentage (%)
1	Workshop	1	1	100
2	Classroom	4	2	50
3	Library	1	1	100
4	Chalkboard	5	2	40
5	Display board	5	-	-

6	Resistors	20	5	25
7	Diodes	15	3	20
8	Transistors	20	1	5
9	Capacitors	20	2	10
10	Thyristor	5	-	-
11	Wire gauge	5	1	20
12	Measuring tape	10	3	30
13	Metal rectifier	20	2	10
14	Continuity tester	10	1	10
15	Circuit breaker	3	4	133
16	Fuses	10	3	30
17	Screw driver	5	2	40
18	Hammer	10	1	10
19	Soldering iron	5	1	20
20	Fish wire	3	1	33
21	Lead sucker	5	2	40
22	Earth rod	2	1	50
23	Digital meter	10	1	10
24	Tester screw driver	10	1	10
25	Bending spring	3	1	33
26	Cutter	5	1	20
27	Conduit pipe	15	4	26
28	Ammeter 0-5A	2	1	50
29	Voltmeter 100v	10	2	20
30	Ohmmeter	2	1	50
31	Radio	4	2	50
32	Television	3	1	33
33	Video player	2	1	50
34	Computer	3	1	33
35	Transformers	1	1	100
36	Induction coil	4	1	25
37	Aluminum bare conductor	2	1	50
38	Armoured cable	2	-	-
39	Alternator	3	-	-
40	Control panel	5	2	40

Table 1 above shows that workshop is 100% available, library is 100%, classroom is 50% and chalkboard is 40% available. The data showed that other physical facilities were lacking, for example display board.

The table also shows the distribution of the available workshopfacilities for teaching basic electricity in the technical colleges as follows: Circuit breaker is more than 100% available, screw driver 40%, ohmmeter (50%), fuses (30%), measuring tape (30%), resistor (25%) and conduit pipe (26%). The next most available workshop facilities included diodes (20%) side cutters 20% and

voltmeter 20%. The other available materials included capacitor, hammer, digital meter, tester screw driver which had the shown percentages. The data showed that other workshop facilities for teaching basic electricity were grossly lacking for example, thyristors, wire gauge, metal rectifier, continuity tester, soldering iron, fishing wire, lead sucker, earth rod, bending spring, computer which had the indicated percentages as shown inTable 1.It implies that availability of workshop facilities for teaching of basic electricity were grossly inadequate because 29 of the listed items had less than 50% availability.

Research Question 2

How often are the available instructional workshop facilities and materials utilized for effective teaching of basic electricity?

Table 2,

Responses on the Utilization of the Physical and Workshop Facilities for Teaching of Basic Electricity Teachers and Students

S/N	ITEMS	AU	SU	RU	NU	$\bar{X}$	REMARK
1	Workshop	48	132	82	53	2.10	RU
2	Classroom	284	165	44	11	3.36	AU
3	Library	45	105	98	52	2.07	RU
4	Chalkboard	224	180	48	10	3.08	SU
5	Display board	52	63	102	65	1.88	NU
6	Resistors	40	120	144	28	2.21	RU
7	Diodes	48	132	82	53	2.10	RU
8	Transistors	56	111	100	49	2.11	RU
9	Capacitors	56	90	104	61	2.07	RU
10	Thyristors	00	03	04	147	1.03	NU
11	Wire gauge	40	120	144	28	2.21	RU
12	Measuring tape	172	171	64	18	2.83	RU
13	Metal rectifier	72	144	126	21	2.42	SU
14	Continuity tester	52	63	102	65	1.88	NU
15	Circuit breaker	172	171	64	18	2.83	SU
16	Fuses	220	141	56	20	2.91	SU
17	Screw driver	204	147	72	14	2.91	SU
18	Hammer	20	132	82	165	2.10	RU
19	Soldering iron	6	120	144	197	2.21	RU
20	Fishing wire	3	120	144	209	2.31	RU
21	Leader Sucker	120	111	100	35	2.44	RU
22	Earth rod	56	90	104	61	2.07	RU
23	Digital meter	176	124	64	18	2.88	RU
24	Tester screw driver	180	196	68	38	3.21	SU
25	Bending spring	56	90	104	61	2.07	RU
26	Side cutter/pliers	192	105	104	54	3.03	SU
27	Conduit pipe	72	144	126	21	2.42	RU
28	Ammeter 0-5A	56	90	104	61	2.07	RU
29	Voltmeter 100v	56	111	100	49	2.11	RU
30	Ohmmeter	168	132	112	53	3.10	SU

31	Radio	160	105	102	65	2.88	RU
32	Television	56	105	98	42	2.07	RU
33	Video player	04	06	102	101	1.42	NU
34	Computer	04	04	72	102	1.21	NU
35	Transformers	164	141	120	31	3.04	SU
36	Induction coil	12	06	12	125	1.03	NU
37	Aluminium bare conductor	16	21	94	55	1.24	NU
38	Armoured cable	08	45	86	53	1.28	NU
39	Alternator	12	12	90	101	1.43	NU
40	Control panel	128	138	116	83	3.10	SU

The table 2 above shows that items,2, 4, 12, 15, 16 and 17 had their mean score above 2.50 which proved that, the respondents agreed that they always utilized, classroom, chalkboard, measuring tape, circuit breakers, fuses and screw drivers during the teaching and learning of basic electricity in technical colleges in Ebonyi State. Items such as display board (1.88), thyristors (1.03) continuity testers (1.88), video player (1.42), computer (1.21), induction coil (1.03) bare aluminum conductor (1.24) armored cable (1.28) and alternator (1.43) all had mean lower than 2.00 indicating they were never used in the teaching of Basic electricity in the colleges. Other items had various levels of utilization as indicated in the table.

Table 3

Two-tailed t-test of Difference Between the Mean Responses of Basic Electricity Teachers and Students on how often Available InstructionalFacilities andMaterials are Utilized for Effective Teaching of Basic Electricity.

S/N	ITEMS	$\bar{X}_t$	$\bar{X}_s$	t-cal	Remark
1	Workshop	2.16	2.04	0.54	NS
2	Classroom	3.47	3.24	0.66	NS
3	Library	2.08	2.05	0.47	NS
4	Chalkboard	3.18	2.98	0.62	NS
5	Display board	1.90	1.86	0.48	NS
6	Resistors	2.42	2.00	1.10	NS
7	Diodes	1.44	2.75	2.54	S
8	Transistors	1.35	2.88	2.66	S
9	Capacitors	1.75	2.39	1.41	NS
10	Thyristors	1.13	0.93	0.62	NS
11	Wire gauge	2.64	1.79	1.87	NS
12	Measuring tape	2.80	2.86	0.49	NS
13	Metal rectifier	2.49	2.85	0.56	NS
14	Continuity tester	1.64	2.11	1.13	NS
15	Circuit breaker	2.92	2.75	0.59	NS
16	Fuses	3.02	2.81	0.61	NS
17	Screw driver	2.26	1.94	0.88	NS
18	Hammer	3.02	2.81	0.61	NS
19	Soldering iron	2.31	2.11	0.62	NS
20	Fishing wire	2.43	2.19	0.68	NS

21	Leader Sucker	2.51	2.37	0.56	NS
22	Earth rod	2.11	2.03	0.49	NS
23	Digital meter	2.91	2.85	0.49	NS
24	Tester screw driver	3.22	3.19	0.78	NS
25	Bending spring	2.15	199	087	NS
26	Side cutter/pliers	3.09	2.97	0.54	NS
27	Conduit pipe	246	2.38	0.48	NS
28	Ammeter 0-5A	2.11	2.02	069	NS
29	Voltmeter 100v	2.19	2.03	0.87	NS
30	Ohmmeter	3.21	2.99	1.03	NS
31	Radio	2.81	2.95	0.56	NS
32	Television	2.04	2.30	1.05	NS
33	Video player	1.39	1.45	0.49	NS
34	Computer	1.09	1.33	0.68	NS
35	Transformers	2.93	3.15	0.63	NS
36	Induction coil	1.10	0.96	0.56	NS
37	Aluminium bare conductor	1.27	1.21	0.49	NS
38	Armoured cable	1.38	1.18	0.62	NS
39	Alternator	1.47	1.38	0.51	NS
40	Control panel	3.11	3.08	0.47	NS

KEY:
X_t = mean for basic electricity teachers' response ($N_t = 8$).
$\overline{X}_s$ = mean for basic electricity students' ($N_s = 142$)
df = Degree of freedom (Df) = $N_S + N_t - 2 = 148$
$P<0.05$ ∴T-table = 1.96 (two-tailed)
Ns = No significant difference in means
S = significant different in means.

The result of hypothesis test in Table 3 showed that in most of the items there was no statistical significant difference between the responses of basic electricity teachers and those of their students. Only items 7 and 8 showed significant difference.

Findings of the study

The major findings of this study from analysis of the data include;

1. Physical facilities such as workshop and library are 100% available for the teaching of basic electricity.
2. Physical facilities such as classroom is (50%) available and chalkboard is (40%) available for teaching basic electricity.
3. Display board is not available for teaching of basic electricity.
4. Workshop facilities like circuit breaker is more than (100%) available for teaching basic electricity.
5. Workshop facilities such as diode, voltmeter, cutter and conduit pipe are (20%) available for teaching of basic electricity.
6. Workshop facilities such as capacitors, hammer, digital meter and tester screw driver are (10%) available for teaching of basic electricity.

7. Workshop facilities such as ohmmeter is (50%), screw driver is (40%), fuses is (30%) available, resistor is (25%) available for teaching basic electricity.
8. Workshop facilities such as thyristor, armoured cable, alternator are not available for the teaching of basic electricity.
9. Classroom, chalkboard, measuring tape, circuit breaker, fuses and screw driver are utilized for the teaching of basic electricity.
10. Only two items had significant difference in the mean rating of teachers and students (i.e. 7 and 8).

Discussion of Findings

The results of this study have shown that the most available physical facilities are workshop and library and the most next available facilities are chalk board and classroom, while display board is not available for teaching electricity, this is in line with Arisi (1998) who noted that more than 90% of the technical colleges she investigated in Edo State lacked physical facilities except for the named few above.Workshop facilities are not available for the teaching of basic electricity, this is in line with Inyang-Abia (1992) who noted the non-availability of workshop facilities in most technical colleges in AkwaIbom State.

The study has equally shown that the few instructionalmaterials available for teaching basic electricity such as capacitors, radios, computer alternators, transformers and others are poorly utilized. This is in line with Dahar&Faize (2011) andOwoh (2009) who noted that there was great deficiency in the use of instructional facilities in technical colleges.

Recommendations

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

1. All stakeholders including the federal, state and local governments and private sector should contribute financially and materially in the provision of instructional facilities for teaching basic electricity.
2. Regular workshops/seminars should be organized for basic electricity teachers by head teachers and principals on the importance and current developments and process in the utilization of instructional facilities for teaching basic electricity in technical colleges.
3. School heads, principals and officials of the ministry of education should ensure regular supervision to enhance effective utilization of instructional facilities available for teaching of basic electricity in technical colleges.

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