

Material Resource Management for Effective Teaching of Electrical/Electronics Technology in Colleges of Education (Technical) in Nigeria

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Abstract

Most of the material resources in different schools workshop are poorly managed for instructional activities in electrical/electronics technology. The improper management of material resources is manifested in the large number of obsolete and unserviceable equipment prevalent in school shops. The upshot of improper management of material resources is dearth of functional tools and equipment and this cripples effective teaching and students' acquisition of skills. This study was carried out to determine material resource management for effective teaching of electrical/electronics technology education in South-South and South-Eastern States of Nigeria. Four research questions were developed and answered. Four null hypotheses were formulated and were tested at 0.05 level of significance. A structured questionnaire was developed and used for data collection and was validated by three experts. The reliability of the questionnaire was established by Cronbach's alpha reliability method and the result showed reliability coefficient of 0.19. Copies of questionnaire were administered to 42 respondents to collect data. The data collected were analyzed using mean to answer the research questions and t- test statistics to test the null hypotheses. The findings of the study showed that all the 50 items of the questionnaire on planning, organizing, controlling and coordinating were agree by respondents as needed in management of material resources for effective teaching of electrical/electronics technology. The results of the null hypotheses tested revealed that there was no significant difference in mean responses of the respondents on the planning, organizing, controlling and coordinating strategies for proper management of material resources for effective teaching of electrical/electronics technology education. The study recommended that government through the ministry of education should organize workshop on the findings of this study for lecturers and instructors to enhance their knowledge and skills on management of material resources.

INTRODUCTION

Technical education is the aspect of education designed to prepare individual for employment in specific area of occupation. Adeyemi and Uko-aviomoh (2004) defined it as that aspect of education, which leads to the acquisition of practical and applied skills as well as basic scientific knowledge. Philips (2001) described technical education as the academic and vocational preparation of students for jobs involving applied science and modern technology. The Federal Ministry of Education (2004) outlined the range of courses in technical education which electrical/electronics is included. Electrical/Electronics technology is a course in technical education that equips one with specific skills, knowledge, and attitudes so as to maintain, repair, and construct basic electrical/electronic systems in practice. John (2009) stated that electrical/electronics technology equips student with knowledge, skills and attitudes needed for performance in the field of electrical/electronics and for gainful employment.

Electrical/Electronics technology is offered in technical colleges, polytechnics, monotecnics, colleges of education (technical) and universities. College of education (Technical) is a level of education for production of technical teachers with Nigeria Certificate in Education (NCE). Eyibe (1998) stated that one of the objectives of technical education at NCE level is to produce technical teachers who will be able to inculcate scientific and technological attitudes and values into the trainees. Technical education prepares recipients for employment opportunities in technical fields. Osuala (1991) stated that technical education prepares technicians for employment opportunities by giving them training in the use of drawing instruments, gauges, applied sciences, mathematics, common sense, initiative, analysis, and diagnosis; by training them on how to collect data, make computations, perform laboratory test and prepare report; and by providing experience in planning, repairing, supervising and controlling machines. Electrical/electronics lecturers in colleges of education (Technical) are expected to inculcate these skills in their students as contained in the curriculum.

This can be achieved through effective teaching. Britton in Chukwuani (1989) stated that for teaching to be a pleasure and be effective, that the material resources needed in workshop must be of appropriate number through proper planning.

Material resources according to Odigbo (1999) refers to either fixed or movable objects, equipment, supplies and facilities which may be private, public or government property that may be turned into educational use for attainment of set goals. Material resources in technical education are the essential concrete features that enable the instructor teach effectively in Industrial Technical Education workshop and classroom (Okoro, 1999 and Oranu, 1994). Wang (1993) stated that material resources which he called physical faculties helped the teacher to convey intended messages effectively so that learner receives, understands, retains, and applies experiences gained to reach overall educational goals.

Material resources for teaching of electrical/electronics technology among others include; workshop, laboratory, workbenches, wiring boards, meters, Drilling machines (portable), cold chisels, power hand drills, electric soldering iron, universal pipe bending machines, Drill bit set, files (assorted), screw drivers (assorted), Hydrometers, Batteries (assorted), Hammers, (assorted), Steel rules (assorted), Magnets (assorted), Relays, Switches (assorted), Tubes (assorted), Thermostats, Conduit pipes, Joint junction boxes, Socket outlets, Plugs (assorted), Digital meters, Analogue meters, Oscilloscopes, Function generators, Television receivers, Radio receivers, Variable power supply, Inductors (assorted), Lead sucker, Side cutters, etc. These resources are of great importance to teaching of electrical/electronics technology.

Britton in Chukwuani (1989) stated that material resources for technological education must be in perfect condition for success to be achieved. He added that for teaching to be a pleasure that the material resources needed in a laboratory or workshop must be of appropriate number through proper planning. Onyemaechi (2004) stated that the effectiveness of any tool, equipment, and machine in performing specific function will be the outcome of effective management by lecturers, instructors, students and school administrators alike. This is why Uzoagulu (1995) pointed out that for technological education to be effective, a culture of prudent management of available local and imported materials must be developed to avoid wastage of resources.

Management according to Tarig (2008) is defined as a process of coordinating work activities so that they are completed efficiently and effectively with and through people. He went further to say that management is a process of planning, organizing, leading and controlling all activities of the organization in pursuit of pre-determined objectives. Davis (2007), listed management functions to include: planning, organizing, leading or motivating, coordinating and controlling. Management in the context of this study is the act

of planning, organizing, controlling and coordinating the activities of electrical/electronics technology in order to achieve its objectives.

Material resources for teaching of electrical/electronics technology cannot be effectively utilized to achieve objectives without proper planning, organization, coordination, and controlling. Azubike (1993) described material resource management as a process of making decision on how material resources could be procured, managed, used and maintained for the development of vocational education. Olaitan, Nwachukwu, Onyemachi, Igbo and Ekong (1999) stated that effective techniques for laboratory resource management is the involvement of laboratory staff in planning, organizing, controlling, and coordinating training facilities for the purpose of learning skills in various occupations. Material resource management in the context of this study is the act of planning, organizing coordinating and controlling material resources of an organization or institution like technical colleges of education.

Geoffrey and Everard (1985) stated that it is important to make sure that material resources actually present in a school are known and that there is need for keeping up to date inventories which are periodically checked. This should be done by the lecturer in charge or instructors and periodically supervised by the head of department. Lecturers and instructors in this study are those teaching and directing the activities of electrical/electronics technology for students acquisition of knowledge and skills. The extents to which they perform their duties depend on their experiences and their possession of skills for managing material resources of electrical/electronics technology. Ben Peter (1996) stated that teachers like other practioners learn from their experiences, which shape the wisdom of practice enacted in the classrooms. In the same vein, Adebesein (2003) stated that effective workshop management requires that the manager be vast in the area of store keeping. Ivowi (1996) corroborated this fact by stressing that teachers should be able to plan, organize, coordinate and encourage growth and creativity in teaching and learning in order to meet instructional objectives.

Planning according to Dale (1981) implies the thoughtful determination and systematic arrangement of all factors required to achieve the goals and objectives of electrical/electronics education. Oranu (1994) stated that well planned material resources would not only enhance the learning process, but also pave way for launching new programme. Failure to plan gives rise to inefficiency, lack of direction and waste of resources and this seems to be the case in most colleges of education (technical).

Leading is a management function that involves influencing people so as to contribute to organization group goals (Weihrich and Koontz, 2003). It is a management effort that involves manager's ability to stimulate high performance in the employees. It implies that head of departments as managers should stimulate culture of prudent management of

material resources in the lecturers and instructors to enhance effectiveness. Coordination is a management function, which results in the integration of the activities of people in the use of facilities and materials and handing the asset of the enterprise to accomplish unified approach to pre-determined goals and objectives. Nwachukwu (2006) stated that coordinating is the task of management whereby the plans and organization are kept under continuous surveillance so that operating efficiency is monitored and difficulties are foreseen. Effective coordination ensures smooth running of a set up. Effective coordination of material resources for teaching of electrical/electronics will create enabling environment and ensures that all materials are put to use for students acquisition of skills. Oliatan, Nwachukwu, Igbo, Onyemacchi, and Ekong (1999) stated that when tools and equipment are effectively coordinated, the result will be the production of efficient, effective and employable graduates. But Okafor (2007) observed that the NCE technical final year students have not acquired enough psychomotor skills needed for self-reliance. The implication is that material resources have not been effectively coordinated to result to the production of employable graduates.

Controlling involves seeing that the action is according to specification and taking remedial actions when needed to prevent unsatisfactory results. Movement of materials in electrical/electronics workshop or laboratory should be controlled to avoid loss of materials. Uwaifo and Uwaifo (2009) observed that these materials suffer pilferation in the hands of teachers and students. This is an indication of poor management of material resources and as rightly stated by Adebisin (2003) that mis-management of available material resources in vocational technical department which electrical/electronics is included has aggravated its inadequacy. This implies that effective supervision should be adopted to control the use of materials resources.

The ultimate goal of any instructional activity is to facilitate effective teaching and meaningful learning. Ukeje (1998) described teaching as the process of guidance by which the learner is made to grasp ideas and facts and develop skills. It is the process of transmitting knowledge, attitudes and skills. Effectiveness according to Awotua-Efebo in Ogbuanya (2005) is generally referred to as the extent to which somebody achieves his purpose. It is about doing the right things in the teaching/learning process so that at the end of the lesson (s), the goals and objectives of the lesson(s), can be achieved. Effective teaching therefore, involves more than the simple transmission of information and includes motivating students and creating a positive classroom environment as well. Effective teaching of electrical/electronics education requires proper management of material resources for students acquisition of skills.

Emphasizing this, Uzoagulu (1993) asserted that to give training and impact the required skills, equipment and materials must be properly managed and effectively utilized.

This implies that proper management has a ripple effect as it affects all facets of teaching and learning. Adeyemi and Uko-Aviomoh (2004) writing on effective delivery of technological education observed that the size of workshop, laboratory, classroom or studio is not determined to accommodate the number of students that may be taught in it. Peter (2003) observed that there is generally poor management of classrooms, workshops, and training materials, obsolete equipment, improper record keeping and poor maintenance of tools, equipment and machines in technical education workshops.

Consequently, the NCE (Technical) graduates of electrical/electronic technology perform poorly in skill demonstration and transfer (Uwaifo and Uwaifo 2009). Under this scenario, it becomes necessary that material resources should be properly managed by school administrators, Head of Departments, teachers and instructors alike to aid the student's acquisition of desired vocational skills and to reduce wastage and vandalization of materials.

RESEARCH QUESTIONS

The study answered to the following research questions.

1. What are the planning strategies needed for proper management of material resources in teaching of electrical/electronics education?
2. What are the organizational strategies that will help in the management of material resources for effective teaching of electrical/electronics education?
3. What are the controlling strategies needed for proper management of material resources for effective teaching of electrical/electronics education?
4. What are the strategies for coordinating material resources for effective teaching of electrical/electronics education?

Hypotheses

The following null hypotheses were formulated to guide the study and was tested at 0.05 level of significance.

- H₀₁: There is no significant difference in the mean responses of lecturers and instructors of electrical/electronics technology, on the planning activities needed for proper management of material resources.
- H₀₂: There is no significant difference between the means responses of lecturers and instructors of electrical/electronics, on the organization strategies that will help in management of material resources for effective teaching of electrical/electronics education.

- Ho₃: There is no significant difference between the mean responses of lecturers and instructors on the controlling strategies needed for management of material resources for effective teaching of electrical/electronics education.
- Ho₄: There is no significant difference between the mean responses of lecturers and instructors of electrical/electronics technology, on the strategies for coordinating material resources for teaching of electrical/electronics education.

METHOD

Design of the Study

The study adopted a survey research design. Wolman in Ezeji (2004) stated that a survey research is the one, which involves the assessment of public opinion using questionnaire and sampling method. This design was suitable since this study elicit information on strategies for management of material resources for effective teaching of electrical/electronics technology.

Area of the Study

The study was carried out in South-South and South-Eastern states of Nigeria. The states include; Abia, Anambra, Enugu, Imo, Ebonyi, Akwa Ibom, Cross-River, Delta, Edo, Bayelsa and River States. The study involved colleges of education offering technical education in these States. This area was chosen because most of these states are developing states and such there are many activities requiring the skill of craftsmen and technicians. These technicians are framed by teachers who are graduates of colleges of education.

Population of the Study

The population of the study comprised of 42 respondents (27 lecturers and 15 instructors) in electrical/electronics in colleges of education (technical) in the South-South and South-East. The population was based on information collected from personnel service unit of each school. The entire population was studied, hence there was no sampling.

Instrument for Data Collection

A structured questionnaire was used for data collection. The questionnaire was divided into five sections of A, B, C, D, and E. Section A elicited personal information from the respondents. Section B consist of items eliciting information on planning strategies for management of material resources for effective teaching of electrical/electronics. Section C contains items designed to determine the organizing strategies for management of material resource. Section D consists of

items soliciting information on controlling strategies for management of material resources. Section E contains items designed to determined coordination strategies needed for management of material resources for effective teaching of electrical/electronics technology. The responses on the questionnaire was structured on 5-point likert scale of strongly Agreed (SA), Agree (A), Undecided (UN), Disagree (D), and Strongly Disagree (SD). The respondents will be asked to check (√) against the response category that match their degree of agree or disagree.

Validation of the Instrument

The questionnaire was validated by three experts, two from industrial technical education and one from business education in the department of Vocational Teacher Education, University of Nigeria, Nsukka. Each validator assessed the appropriateness of each item to the intending purpose. The validators corrections were considered and used in the final draft of the questionnaire.

Reliability of the Instrument

The Cronbach's Alpha co-efficient method was used to determine the reliability of the instrument. It was obtained by administrating a single test to 9 selected lecturers of electrical/electronics technology and 5 instructors of electrical/electronics in selected colleges of education (technical) in Enugu and Anambra States. The data obtained from administration of the instrument was analyzed by finding the variance of each item of the instrument and variance of the total number of items in each section of the instrument. The variances were used to calculate the alpha co-efficient of the instrument. The result is a co-efficient of his value represented the reliability coefficient of the instrument.

Method of Data Collection

The researchers with five research assistants administered and collected the questionnaire. The research assistants were instructed on how to administer questionnaire to ensure high percentage return.

Method of Data Analysis

Mean was used to answer the four research questions. In calculating the Mean the response categories was assigned numerical values of 5-1 from strongly agree to strongly disagree. The mean of the response category is 3. The lower limit is 2.50 and the upper limit is 3.50. Therefore, any item with the mean of 3.50 and above will be considered agree while those with mean below 3.50 will be considered disagree. This is because 3.50 is the true lower limit of agree in the response continuum. The hypothesis was analyzed

using t-test at significant level of 0.05 and 40 degree of freedom. The null hypothesis was rejected for items with t-calculated greater than the table value and accepted for t-calculated values less than t-table values.

RESULTS

Research Question 1:

What are the planning strategies needed for proper management of material resources in teaching of electrical/electronics technology education?

Table 1: Mean responses of Electrical/electronics lecturers and instructors on planning strategies needed for proper management of material resources in teaching o electrical/electronic technology education.

Item No	The planning strategies should involve	\bar{X}	Remark
1	Providing adequate funds for the purchase of consumable materials such as lead and maintenance of existing facilities.	4.48	Agree
2	Workshop facilities should be planned based on current students' enrolment	3.57	Agree
3	Adequate number of electrical/electronics tools and equipment should be provided in the workshop such as electric soldering iron, function generators, screw drivers etc.	4.45	Agree
4	Machines and equipment such as digital meters, pipe-bending machines etc. should be located appropriately on the workshop floor.	4.31	Agree
5	Equipment and materials should be planned based on the electrical/electronics curriculum.	4.38	Agree
6	Equipment, tools and materials used in teaching of electrical/electronics courses should be planned yearly.	4.21	Agree
7	Shop stores should be provided for safety of consumables	4.36	Agree
8	Machines, switches and socket outlets for should be located for convenience and safety.	4.21	Agree
9	Planning the workshop to carter for students practical work in areas of construction of appliances.	4.26	Agree
10	Deciding the method of storage required for each material used in electrical/electronic technology	4.02	Agree
11	Workshop management committee should be set up to comprise of lecturers and workshop instructors in electrical/electronics technology.	4.33	Agree
12	Borrower-loss replacement system should be adopted to check losses.	4.00	Agree
13	Workshop should be planned with adequate ventilation, illumination and artificial lighting	4.36	Agree
14	Maintenance schedule should be developed for regular maintenance of tools, equipment and machines	4.36	Agree
15	Develop and operate within constraints of a budget.	4.19	Agree
17	Rotational plan should be developed to move students through skill areas as installation and repairs as well as design of appliances.	4.31	Agree
17	Technical manuals should be use to order replacement parts for electrical/electronics equipment.	4.12	Agree

Table 1 above revealed that all items on planning strategies were rated by the respondents with their means scores ranging form 3.37 to 4.48. This signifies that all the items on planning

strategies are effective in management of material resources for effective teaching of electrical/electronics technology education.

Research Question 2

What are the organizational strategies that will help in the management of material resources for effective teaching of electrical/electronics technology education?

Table 2: Mean responses of lecturers and instructors of electrical/electronics on organizing strategies that will help in the management of material resources for effective teaching of electrical/electronics technology.

Item No	Organization of material resources should involve	\bar{X}	Remark
18	Equipment should be arranged to facilitate teaching and learning	4.33	Agree
19	Arrangement of tools and materials before and after use.	4.33	Agree
20	Proper records of all the shop equipment and tools should be kept.	4.33	Agree
21	Tools and equipment should be used for activities they are designed for	4.36	Agree
22	There should be regular supervision of electrical/electronics tool inventories to check losses	4.43	Agree
23	Safety inspections should be conducted regularly and hazardous condition corrected.	4.48	Agree
24	Develop a procedure to insure proper electrical/electronics lab clean up.	4.21	Agree
25	Equipment in electrical/electronics workshop should be well arrange to enhance safety, efficiency, and learning.	4.24	Agree
26	Procedures to facilitate storage, checkout, and security of tools and equipment should be developed.	4.24	Agree
27	Work stations should be designate and equipping for each skill area such as installation, repairs, maintenance, design and construction.	4.21	Agree
28	Professional service person should be invited to make major electrical/electronics equipment repairs.	4.33	Agree
29	Storing the materials in a lockable cabinet.	4.07	Agree
30	Minor repairs (predictive maintenance) of the electrical/electronics facilities should be made to avoid breakdown.	4.38	Agree
31	Equipment should be organized to facilitate movement of people in the workshop.	4.26	Agree
32	Students should be grouped during shop practice to enhance mastery.	4.19	Agree

Table 2 showed that all the 15 items on organizing strategies had their mean scores between 4.07 to 4.48. This indicated that respondents agreed to all the items as important organizing strategies for management of material resources for effective teaching of electrical/electronics technology education.

Research Question 3

What are the controlling strategies need for proper management of material resources for effective teaching of electrical/electronics technology education?

Table 3: Mean responses of lecturers and instructors on controlling strategies needed for proper management of material resources for effective teaching of electrical/electronics technology education.

Item			
No	Controlling strategies should involve	\bar{X}	Remark
33	Selecting, storing, and maintaining protective equipment such as apron, insulated hand grooves etc. for student use.	4.26	Agree
34	Promoting laboratory safety by colour coding equipment, marking safety zones, and posting appropriate safety signs in electrical/electronics workshop.	4.38	Agree
35	An identification system should be used to deter tool and equipment theft.	4.26	Agree
36	Students should be guided in the use of appropriate tools, equipment and machine in electrical/electronic workshop.	4.24	Agree
37	Lecturer and workshop staff should prepare directives for the use of machines, tools and materials.	4.31	Agree
38	Maintaining a complete inventory of tools at the end of each class.	4.21	Agree
39	There should be a competent storekeeper who should be responsible for the security of electrical/electronics tools and equipment.	4.31	Agree
40	Tool loan slips should be given to students and staff who want to borrow any tool/equipment.	4.88	Agree
41	Accurate inventory of materials in stock such as batteries, magnets, side cutters etc. should be kept.	4.31	Agree
42	There should be adequate check to avoid careless loss of tools and equipment due to pilferation and vandalization.	4.31	Agree
43	Maintenance and storage of tools and equipment should be well supervised.	4.29	Agree

Table 3 indicated that all the 11 items on controlling strategies are needed in management of material resources for effective teaching of electrical/electronics education. All the items were rated agree with their mean scores ranging between 3.88 to 4.38.

Research Question 4

What are the strategies for coordinating material resources for effective teaching of electrical/electronics technology education?

Table 4: Mean responses of lecturers and instructors on strategies for coordinating material resources for effective teaching of electrical/electronics technology education.

Item No	Coordinating strategies should involve the following	\bar{X}	Remark
44	There should be periodic inventory and inspection of tools and equipment in the workshop.	4.38	Agree
45	Teachers are to submit weekly performance chart on the usage of tools and equipment such as hammers, soldering iron, lead sucker etc. to Head of Department	4.12	Agree
46	Lost tools should be replaced to make them readily available	4.38	Agree
47	Regular maintenance should be carried out to ensure that workshop facilities are in good condition at all times.	4.29	Agree
48	Students personnel system and safety committee should be set up for management of electrical/electronic workshop.	4.07	Agree
49	Workshop tools and equipment should be in constant use by staff and students to minimize wastage.	4.17	Agree
50	There should be proper supervision of students and other users of workshop facilities.	4.33	Agree

The response in table 4 above revealed that respondents agree to the entire 7 items as needed coordinating strategies in management of material resources for effective teaching of electrical/electronics technology education. This was seen from their mean ranging between 4.07 to 4.38.

Hypothesis 1

There is no significant difference in the mean responses of lecturers and instructors of electrical/electronics technology on the planning activities needed for proper management of material resources.

Table 5: T-test analysis of mean rating of respondents on planning strategies needed for proper management of material resources for effective teaching of electrical/electronics technology.

S/N	Planning strategies	Lecturers N ₁ = 27		Instructors N ₂ = 15	t-cal	t-tab		Remark
		\bar{x}_1	s_1^2					
1	Providing adequate funds for the purchase of consumable materials such as lead and maintenance of existing facilities.	4.25	0.26	4.33	0.24	1.19	2.02	Not Significant
2	Workshop facilities should be planned based on current student' enrolment	4.19	0.85	4.13	0.12	0.30	2.02	Not Significant
3	Adequate number of electrical/electronics tools and equipment should be provided in the workshop such as electric soldering iron, function generators, screw drivers	4.52	0.26	4.40	0.26	0.73	20.2	Not Significant

4	etc. Machines and equipment such as digital meters, pipe-bending machines etc. should be located appropriately on the workshop floor.	4.41	0.25	4.27	0.21	0.92	2.02	Not Significant
5	Equipment and materials should be planned based on the electrical/electronics curriculum.	4.52	0.26	4.27	0.21	1.64	2.02	Not Significant
6	Equipment, tools and materials used in teaching of electrical/electronics courses should be planned yearly.	4.52	0.26	4.47	0.41	0.26	2.02	Not Significant
7	Shop stores should be provided for safety of consumables	4.48	0.26	4.40	0.40	0.42	2.02	Not Significant
8	Machines, switches and socket outlets for should be located for convenience and safety.	4.26	0.43	4.33	0.24	-0.39	2.02	Not Significant
9	Planning the workshop to cater for students practical work in areas of construction of appliances.	4.30	0.29	4.33	0.24	-0.18	2.02	Not Significant
10	Deciding the method of storage required for each material used in electrical/electronic technology.	4.19	0.55	4.00	0.14	1.10	2.02	Not Significant
11	Workshop management committee should be set up to comprise of lecturers and workshop instructors in electrical/electronics technology.	4.41	0.33	4.33	0.24	0.48	2.02	Not Significant
12	Borrower –loss replacement system should be adopted to check losses.	4.19	0.29	3.60	1.11	2.03	2.02	Not Significant
13	Workshop should be planned with adequate ventilation, illumination and artificial lighting.	4.48	0.26	4.27	0.35	1.16	2.02	Not Significant
14	Maintenance schedule should be developed for regular maintenance of tools, equipment and machines	4.52	0.26	4.33	0.38	1.02	2.02	Not Significant
15	Develop and operate within constraints of a budget	4.04	0.50	4.47	0.27	-2.25	2.02	Not Significant
16	Rotational plan should be developed to move students through skill areas as installation and repairs as well as design of appliances.	4.22	0.49	4.27	0.50	-0.22	2.02	Not Significant
17	Technical manuals should be use to order replacement parts for electrical/electronics equipment.	4.11	0.41	4.20	0.46	-0.42	2.02	Not Significant
Overall		4.38	0.32	4.26	0.36	0.63	2.02	NS

Degree of freedom = 40; prob of 0.05

t-table = 2.02

data presented on table 5 showed that of 17 items in the table, there was no significant difference on 16 items, while item 12 showed significant difference on the responses of lecturers and instructors. The overall t-cal for the table is 0.63, which is less than t-table value. Hence the null hypothesis was upheld.

Hypothesis 2

There is no significant difference in the mean responses of lecturers and instructors of electrical/electronics technology on the organization strategies that will help in management of material resources for effective teaching of electrical/electronics technology education

Table 6: T –test analysis on the mean responses of the respondents on the organization strategies for proper management of material resources.

S/N	Organizing Strategies	Lecturers		Instructors		t-cal	t-tab	Remark
		N ₁ = 27		N ₂ = 15				
		\bar{x}_1	s_1^2	\bar{x}_2	s_2^2			
18	Equipment should be arranged to facilitate teaching and learning of electrical/electronics technology.	4.41	0.25	4.27	0.21	0.92	2.02	Not Significant
19	Arrangement of tools and materials before and after use.	4.44	0.26	4.20	0.17	1.66	2.02	Not Significant
20	Proper records of all the shop equipment and tools should be kept.	4.48	0.26	4.27	0.21	1.37	2.02	Not Significant
21	Tools and equipment should be used for activities they are designed for	4.44	0.26	4.27	0.21	1.11	2.02	Not Significant
22	There should be regular supervision of electrical/electronics tool inventories to check losses.	4.41	0.25	4.47	0.41	-0.37	2.02	Not Significant
23	Safety inspections should be conducted regularly and hazardous condition corrected.	4.52	0.26	4.47	0.27	0.30	2.02	Not Significant
24	Develop a procedure to insure proper electrical/electronics lab clean up.	4.30	0.22	4.13	0.55	0.90	2.02	Not Significant
25	Equipment in electrical/electronics workshop should be well arrange to enhance safety, efficiency, and learning	4.41	0.25	4.33	0.24	0.50	2.02	Not Significant
26	Procedures to facilitate storage, checkout, and security of tools and equipment should be developed.	4.30	0.22	4.13	0.41	0.90	2.02	Not Significant
27	Work stations should be designate and equipping for each skill area such as installation, repairs, maintenance, design and construction.	4.19	0.39	4.27	0.50	-0.37	2.02	Not Significant
28	Professional service person should be invited to make major electrical/electronics equipment repairs.	4.52	0.26	4.33	0.24	1.19	2.02	Not Significant
29	Storing the materials in a lockable cabinet.	4.30	0.37	3.73	1.07	-1.47	2.02	Not Significant
30	Minor repairs (predictive maintenance) of the	4.37	0.32	4.47	0.27	-0.58	2.02	Not Significant

electrical/electronics facilities should be made to avoid breakdown.

31	Equipment should be organized to facilitate movement of people in the workshop.	4.33	0.46	4.20	0.31	0.67	2.02	Not Significant
32	Students should be grouped during shop practice to enhance mastery.	4.37	0.55	4.20	0.31	0.84	2.02	Not Significant

Df = 40

Table 6 showed that all the items had their t-calculated less than t-table. This indicated that there was no significant difference on the mean responses of the two groups. Therefore, the null hypothesis of no significant difference was upheld.

Hypothesis 3

There is no significant difference between the mean responses of lecturers and instructors of electrical/electronics on the controlling strategies needed for management of material resources for effective teaching of electrical/electronics education.

Table 7: T-test analysis on the mean responses of respondents on controlling strategies for proper management of material resources.

S/N	Controlling Strategies	Lecturers		Instructors		t-cal	t-tab	Remark
		$N_1 = 27$		$N_2 = 15$				
		\bar{x}_1	s_1^2	\bar{x}_2	s_2^2			
33	Selecting, storing, and maintaining protective equipment such as apron, insulated hand grooves etc. for student use.	4.33	0.23	4.20	0.31	0.76	2.02	Not Significant
34	Promoting laboratory safety by colour coding equipment marking safety zones, and posting appropriate safety signs in electrical/electronics workshop.	4.48	0.34	4.33	0.24	0.89	2.02	Not Significant
35	An identification system should be used to deter tool and equipment theft.	4.33	0.23	4.20	0.17	0.92	2.02	Not Significant
36	Students should be guided in the use of appropriate tools, equipment and machine in electrical/electronic workshop.	4.52	0.26	4.20	0.46	1.59	2.02	Not Significant
37	Lecturer and workshop staff should prepare directives for the use of machines, tools and materials.	4.41	0.25	4.13	0.27	1.70	2.02	Not Significant
38	Maintaining a complete inventory tools at the end of each class.	4.07	1.07	4.13	0.98	-0.57	2.02	Not Significant

39	There should be a competent storekeeper who should be responsible for the security of electrical/electronics tools and equipment.	4.41	0.33	4.13	0.27	1.63	2.02	Not Significant
40	Tool loan slips should be given to students and staff who want to borrow any tool/equipment.	4.33	0.31	4.13	0.41	1.02	2.02	Not Significant
41	Accurate inventory of materials in stock such as batteries, magnets, side cutters etc. should be kept.	4.41	0.25	4.27	0.21	0.92	2.02	Not Significant
42	There should be adequate check to avoid careless loss of tools and equipment due to pilferation and vandalization.	4.48	0.26	4.20	0.17	1.93	2.02	Not Significant
43	Maintenance and storage of tools and equipment should be well supervised.	4.44	0.26	4.13	0.27	1.86	2.02	Not Significant

Overall 4.38 0.35 4.19 0.33 1.02 2.02 NS

Data presented on table 7 revealed that all the items had their calculated t-value less than table value at 0.05 level of significance. This showed that there was statistically no significant difference on the mean responses of the two groups. The table also revealed that the overall t-calculated is 1.02, which is less than the t-test of 2.02. Therefore the null hypothesis was upheld.

Hypothesis 4

There is no significant difference between the mean responses of lecturers and instructors on electrical/electronics technology on the strategies for coordinating material resources for teaching of electrical/electronics technology education.

T-test analysis of the mean rating of responses of electrical/electronics lecturers and instructors on strategies for coordinating material resources for effective teaching electrical/electronics education.

S/N	Coordinating Strategies	Lecturers		Instructors		t-cal	t-tab	Remark
		$N_1 = 27$		$N_2 = 15$				
		\bar{x}_1	s_1^2	\bar{x}_2	s_2^2			
44	There should be periodic inventory and inspection of tools and equipment in the workshop.	4.48	0.26	4.27	0.21	1.37	2.02	Not Significant
45	Teachers are to submit weekly performance chart on the usage of tools and equipment such as hammers, soldering iron, lead sucker etc. to Head of Department.	4.26	0.28	4.07	0.50	0.19	2.02	Not Significant
46	Lost tools should be replaced to make them readily available.	4.48	0.26	4.40	0.26	0.49	2.02	Not Significant

47	Regular maintenance should be carried out to ensure that workshop facilities are in good condition at all times.	4.48	0.22	4.20	0.31	0.24	2.02	Not Significant
48	Students personnel system and safety committee should be set up for management of electrical/electronic workshop.	4.30	0.25	4.00	0.86	0.26	2.02	Not Significant
49	Workshop tools and equipment should be in constant use by staff and students to minimize wastage.	4.41	0.26	4.53	0.27	-	2.02	Not Significant
50	There should be proper supervision of students and other users of workshop facilities.	4.44	0.25	4.33	0.24	0.62	2.02	Not Significant
	Overall	4.44	0.25	4.26	0.39	0.80	2.02	NS

Degee of freedom = 40; probability level = 0.05; t-table = 2.02

Data presented on table 8 showed that all the 7 items had their calculated t-value less than t-table value. This showed that there was no significant difference between the mean responses of the two groups on the coordinating strategies in management of material resource. Hence the null hypothesis was upheld.

DISCUSSION

The findings revealed that all the 17 items on planning activities for proper management of material resources was rated agree by respondents. This may be attributed to the importance attached to planning in any management. Planning activities of material resource management are foundation of management for the attainment of objectives of electrical/electronics technology at any reasonable cost. The findings were in line with national policy on education (2004) which stated that the success of any system of education is hinges on proper planning. This calls for electrical/electronics lecturers and instructors to have good knowledge bout planning of resources and activities carried out in the workshop. Such plans from the findings of the study include plans for purchase of tools, machines and other consumable materials that would be needed for developing course outline, unit lessons, learning activities, methods to be used for particular lesson and time required for unit lesson. The findings of the study was also in line with the view of Tarig (2008), who asserted that planning provides direction, reduces uncertainty minimizes waste and redundancy and sets the standards for controlling educational activities. To this, teachers and instructors should adopt and implement these strategies on planning for the material resources for effective teaching of electrical/electronics technology education. The findings also agreed with opinion of Nwachukwu (2006) who said that in planning laboratory/workshop lessons that the quantity of materials available for the lesson should be known

and that tools and equipment should be in good working condition before commencement of the laboratory lessons. The opinion of the experts cited above helped to justify the findings of the study on planning strategies needed in management of material resources effective teaching of electrical/electronics technology.

From the study it was found out that 15 items on the organizing strategies were rated agree by the respondents to be effective for proper management of material resources. The findings among others include; arrangement of tools and materials before and after use; students should be grouped during shop practice to enhance mastery; materials should be stored in cabinet; proper records of all the shop equipment and tools should be kept etc. The findings were in agreement with opinion of Nwachukwu (2006) who stated that organizing represents the way resources connect together to achieve objectives. He elucidated the responsibilities of workshop teacher/instructor in organizing materials resources to include; to arrange all resources in the laboratory in conformity with safety regulations store the materials in a lockable cabinets or open pigeonhole boxes; arrange students into groups for instructions and demonstrations in a small and comfortable area or around a piece of machine; arrange facilities that will enhance security of the laboratory users. Similarly, the finding was in conformity with the view of Okorie (2002) who considered the following principles important for effective organization of material resources, they include: machine and tools should be organized in reference and accountability; proximity to users should be high priority; lost or damage tools should be replaced for continuity of the programme. The findings also agree with submission of Everard and Geoffery (1985) who stated resources actually present in a school workshop are known and that there is need for keeping up to date inventories which are periodically checked. The implication is that electrical/electronics lecturers and instructors should keep up to date inventories of tools

equipment, machines and consumables that will help to minimize lost and enhance effective teaching and learning of electrical/electronics technology. The opinions of the experts cited above helped to justify the findings of the study on organizing strategies needed in management of material resources for effective teaching of electrical/electronics technology.

The findings of the study on controlling strategies showed that the respondents agree to all the 11 items as needed in management of material resources for effective teaching of electrical/electronics technology. The findings among others include; an identification system should be used to deter tool and equipment theft; students should be guided in the use of appropriate tools equipment and machines in electrical/electronics workshop; lecturers and workshop staff should prepare directives for the use of tools, equipment and materials; there should be a competent storekeeper who should be responsible for the security of electrical/electronics tools and equipment etc. The findings was in agreement with view of Momoh (1998) who stated that managerial responsibilities of controlling resources in teaching of electrical/electronics technology involves providing instruction and guiding the use of material and enhance maintenance of machines. Also, supporting the findings was Nneji (2000) who outlined the characteristics of electrical/electronics workshop controller as individual who: ensure that appropriate materials are used for the right job or project; maintain good relationship with laboratory users; ensure maximum productivity and minimum wastage of materials. The findings on controlling strategies was also in consonant with view of Ogbonna (1988) who maintained that someone should be clearly responsible for the control and maintenance of each equipment. The implication from the findings was that teachers of electrical/electronics need the knowledge and skill of controlling to be able to manage material resources effectively and to improve the quality of teaching and learning of electrical/electronics technology. The opinions of the experts cited above helped to justify the findings of the study on the controlling strategies needed in management of materials resources for effective teaching of electrical/electronics technology.

From the study it was found out that 7 items on the coordinating strategies were rated agree by the respondents. The findings was in agreement with opinion of Nwachukwu (2006) who stated that effective coordination of material resources for teaching of electrical/electronics will create enabling environment and ensures that all materials are put to use for students acquisition of skills. The findings of the study equally conforms with submission of Olaitan, Nwachukwu, Igbo, Ohymachi and Ekong (1999) who stated that when tools and equipment are effectively coordinated, the result will be the production of efficient, effective and employable graduates. In the same vein, the study was supported by the view of Adabo (2009) who said that effective coordination of material resources will result to job oriented programmes

which will improve the production of technical manpower. The views of experts cited above helped to justify the findings of the study on coordinating strategies needed in management of material resources for effective teaching of electrical/electronics technology.

From the study it was found out that there was no significant difference in the mean ratings of the responses of lecturers and instructors of electrical/electronics on the planning, organizing, controlling and coordinating strategies needed in management of materials resources for effective teaching of electrical/electronics technology in colleges of education (Technical). Therefore, the null hypotheses of no significant difference in the mean ratings of the respondent were upheld. The implication of this finding is that it helped to validate the findings on sections B ,C, D and E and also it implied that the qualifications and professional experiences of the two groups of respondents had no significant influence on their opinion of the planning, organizing, controlling and coordinating strategies needed in management of material resources for effective teaching of electrical/electronics technology.

CONCLUSION

Teaching and learning of electrical/electronics technology is heavily dependent on workshop activities. Workshop activities cannot be carried out effectively without material resources which must be adequate in number and quality. The available material resources are poorly managed and this hampers the teaching/learning of electrical/electronics technology. Effectiveness could be achieved in teaching/learning of electrical/electronics if there should be judicious management of material resources. To make contribution in this direction, the study looked at material resource management strategies for effective teaching of electrical/electronics technology. The study therefore, made the following contribution to knowledge and management of material resources:

1. It has provided information to lecturers and instructors in electrical/electronics on management strategies for effective teaching of electrical electronics technology.
2. It has provided information to National Commission for Colleges of Education on strategies for managing material resources which they could integrate into the curriculum of technical teacher education.
3. It has provided information on material resource management to different state government in South-South and South-Eastern Nigeria. The information could be package into workshop material for improving the competencies of teachers and instructors.

RECOMMENDATIONS

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

1. State governments through the ministry of education should package the management strategies in managing material resources into workshop materials and organize workshop on them for lecturers and instructors of electrical/electronics to enhance their effective teaching of electrical/electronics in colleges of education (Technical).
2. Lecturers and instructors should implement the knowledge gained in the electrical/electronics classrooms and workshop in order to impart skills on students.
3. The curriculum planners should emphasize management of material resources in the curriculum of technical teacher education and follow up its implementation through accreditation.
4. The curriculum planners should emphasize management of material resources in the curriculum of technical teacher education and follow up its implementation through accreditation.

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