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EFFECT OF UTILIZATION OF WORKSHOP FACILITIES ON STUDENTS' ACADEMIC ACHIEVEMENT AND RETENTION IN ELECTRICAL INSTALLATION AND MAINTENANCE WORKS IN TECHNICAL COLLEGES IN EDO STATE

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ABSTRACT

Improving students' academic performance is a major concern by all stakeholders in education. Many scholars have identified factors responsible for students' poor performance in examinations and possible remedies. One of the remedies is the use of instructional facilities to teach students in order to enhance academic performance. Therefore, this study is concerned with the effect of utilization of workshop instructional facilities on students' academic achievement and retention in electrical installation and maintenance works in technical colleges in Edo State. Two specific purposes were determined, two research questions guided the study and two hypotheses were tested at 0.05 level of significance. The design of the study was quasi experimental of pre-test, post-test non-ramdomized groups. The population of the study was 152 NTC II students offering electrical installation and maintenance works (EIMW) in the four technical colleges in Edo State. Two colleges were purposively selected they have 84 students in their intact classes that were used as experiment (36) and control (48) students respectively. The instrument for data collection was electrical installation and maintenance works achievement test (EIMWAT) which was validated by three experts and had a reliability coefficient of 0.78. The research questions were answered with mean while the hypotheses were tested with Analysis of Covariance (ANCOVA). It was revealed that students taught EIMW using workshop instruction facilities perform better in the post-test that those taught EIMW

without workshop instructional facilities. Also, the findings showed that students taught EIMW with workshop instructional facilities perform better in the retention (second post-test) than those taught without workshop instructional facilities. It was recommended among others that teachers should use workshop instructional facilities to teach students EIMW for improved academic performance.

Keywords: Workshop Instructional facilities, academic achievement

Introduction

Technical colleges are post basic school institutions established by Federal and State governments to implement vocational and technical education programmes at that level. The graduates of Technical college are expected to be equipped with knowledge, understanding and skills that would make them to be either employable or be self-reliant. Establishment of technical college was not only to improve on the skill acquisition but also to encourage occupational development (Pugate, 2010).

Ugwu (2007) observed that the future of any nation lies on the skills, knowledge and abilities of her citizens that are expected to be acquired from technical education offered in technical institutions. The trade subjects that are offered in technical colleges and that could lead to the acquisition of knowledge, skill and right attitude include woodwork technology, building construction technology, metal work technology, automobile technology, electrical and electronic technology. These subjects are departmentalized in technical colleges such that each subjects are further broken down into different subjects. For example the department of electrical and electronics technology has the following subjects: Electrical Installation and Maintenance Works (EIMW), Radio, Television and Electrical Works, Appliances Repairs (NABTEB, 2007).

Electrical installation and maintenance works (EIMW) is one of the trade subject offered in the technical college. It is an aspect of Electrical and Electronics Technology and has three subjects grouping, Domestic and Industrial Installation. Cable Jointing, Battery Charging and Repair, Winding of Electrical Machines.

These three areas are mandatorily taken together as one subject in the certificate examinations but in two papers; namely I and II (theory and practical). Electrical and electronics technology broadly covers power generation, transmission, and distribution, measurement, instrumentation, installation and maintenance, circuit analysis, networking, power and control system, electrical and electronic, drafting and interpretation, radio communication and domestic & industrial wiring (Okala, 2010).

In order to teach and learn these various themes effectively, the teachers and students must use the recommended instructional and learning facilities.

Instructional facilities are those tools, equipment, machines, and consumable materials that are used up in the process of getting learners equipped with the required knowledge and skills within the school system (Akpabio and Ogiriki, 2017). It encompasses all the materials required for functional teaching-learning condition to be attained. According to Briggs and Walson (2018), Instructional facilities are vehicles for effective teaching and learning. The education that brings development is that which is well-funded, provided with state-of-the-art facilities and equipment, with well motivated

and dedicated manpower to impart the science, vocational and technology-compliant curriculum that is relevant to societal and entrepreneurial needs of individuals (Sanusi and Akpotu, 2015)

In electrical and electronics technology, instructional materials involve all the infrastructural and physical facilities in the workshop (Bello and Shu'aibu, 2013). These facilities include all the tools, equipment, machines, and the consumable materials that are being used from time to time for teaching and learning in the college. In order to achieve academic excellence in electrical installation, and maintenance works in technical schools, these instructional materials must be available in right quantities and qualities and be functional. The implementation of technical and vocational education and training involves adequate classroom and workshop facilities for practical purposes. Adequately provided and utilised school facilities will not only enhance good teaching process but also facilitate learning. Instructional facilities enhances the motivation of students by increasing their performances both in internal and external examinations, as well as in retaining the knowledge and skills acquired over a longer time for effective and efficient application both within and outside the four walls of their classrooms. Workshop facilities enhances the quality of instruction both in the short and long run as the quality of education received by students bears directly on the availability or lack of physical facilities which dictates the overall atmosphere in which learning takes place (Ochogba, Johnwest, Isiodu and Igwe, 2017)

Ali, Aliyu and Sunday (2013) asserted that what prevails in most public schools is that workshop facilities which were installed many years ago are still being used and have undergone wear and tear as a result of having been used above their estimated mortal age and as such are begging for both minor and major repairs. On the other hand, some of these facilities are lying idle as the materials needed for practical works are not being provided. Secondly, electricity supply to power the equipment is intermittent. In support of this claim, Emah (2005) observed that the expendable materials required to be sued together with the equipment and machines for practice and for carrying out students project in technical and vocational programme are lacking in schools thereby denying students and teachers the opportunity to use the facilities as at when due. The poor state of EIMW workshop instructional facilities in technical colleges in Edo State is likely to be responsible for the poor academic performance of students and retention in EIMW concepts. Retention in this study is the ability of EIMW students to recall and apply the concepts they have learnt in EIMW after examination. It is the proportion of information remembered by a learner when there is need to recall such information.

According to Ogbu (2015), 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. Gujjar, Khan, Baig, Ramzan and Saifi (2019) were of the opinion that the proper utilization of instructional and physical facilities would improve the performance and output of the institutions. It is therefore presumed that the adequate utilization of instructional facilities in the teaching and learning of Electronics Workshop Practice and Maintenance would improve the performance and output of the technical colleges, thus producing graduates that can be self-

reliant or perform competently in their chosen vocation with little or no need for pre-employment training.

Nwadiani and Ugolo (2011) noted that "teaching and learning facilities constituted one of the major factors contributing to students' academic achievement which is a measure of the extent to which a student has performed in a particular set of tasks that have been taught. It is commonly measure by examination or continuous assessment.

According to Garbanzo (2017) students' academic achievement refers to learning outcome which a student exhibit after teaching and learning processes. Basically, in Nigeria, the quality of school is determine by the academic performance of students especially in external examinations like NECO, WAEC, NABTEB etc vis-à-vis the instructional facilities available to them. The student academic performance appears to help determine whether or not the aims and objectives of education are actualized. When performance is high, it tends to show effectiveness in educational achievement. On the other hand, when performance is low, it tends to show ineffectiveness in educational achievement. Educational effectiveness seems to be determined by the availability of instructional facilities and how such physical resources are well utilized to increase students' academic performance (Ackermn and Heggestad, 2017).

One of the most widely used dichotomous measures in educational research and practice is retention and dropout, typically defined as two sides of the same coin. Student retention and dropout is a major concern for educational institutions around the world. It is not only a problem for educational institutions but has a direct link to the social, economic and political growth of a country, for which educational institutions provides strong foundations. According to Astin (2014) defines retention as staying in school until completion of an academic programme and dropping out as leaving school prematurely. Student retention indicates how well a school ensures academic success or completion. Stakeholders use it to measure a school's performance. The internal promotion of student retention is useful for improving programmes, curriculum, teaching staff, and academic support (Jacobson, 2014).Ayeni (2005) identifies instructional facilities as one of the major determinants of student academic achievement. The author added that poor learning outcome could be as a result of lack of the use of instructional facilities by teachers.

Statement of the Problem

There cannot be effective teaching and learning of electrical installation and maintenance work without the use of workshop instructional facilities. In order for the students to acquire the needed knowledge and skills, they must be taught with the same tools and equipment they will eventually find in the industries and also to effectively demonstrate such knowledge and skills which they are being trained. Graduates of technical colleges up till early 1980s constituted the bulk of middle man power in the industries in Nigeria. Many also became self-reliant and employers of labour. Others who desired to acquire higher qualifications in the university and polytechnics were able to secure admission and coped favourably with the rigors of academic work in engineering and related disciplines possibly due to their background in practical skills. These categories of technical students were taught with workshop instructional facilities. Technical colleges

were then equipped with "state of the arts" workshop facilities which were adequate in both quantity and quality. In the process of time however, these facilities became obsolete, outdated, and inadequate and not digitally friendly. The situation forced technical teachers to teach students without using instructional aids and machines, which of course cannot be easily improvised.

A careful study of National Technical Certificate Examination (NTCE) for electrical installation and maintenance works, clearly reveal that even the theory (Paper I) have question items that are practical based. Such examination questions usually contain diagrams of tools, equipment and circuit diagrams to test how much students are acquainted with the use of those tools and equipment.

Recently, there are reported cases of technical college graduates not been able to recall and explain simple concepts in electrical and electronic technology that they have learnt in school. This is a clear show of the fact that the students may not have been adequately taught and many have only studied to pass examinations and not to retain or apply such. One major worry of the researcher is whether electrical installation and maintenance works (EIMW) teachers in the various colleges utilize the few facilities available. These crops of technical teachers seem to have been addicted to teaching the students without workshop facilities.

These ugly trends may seem to have contributed to the poor academic performance of electrical installation and maintenance works students in NTC examination in recent times and their inability to retain the knowledge and skills they have learnt beyond their certificate examinations. If this situation is not urgently brought under check, there is the possibility that technical college in Edo State will continue to produce graduates who may end-up roaming the streets looking for white collar jobs that are not available. Also, those who wish to further their studies in higher institutions may not be able to gain admission and those who will be admitted may not be able to cope with the academic rigors. This study, therefore intends to experiment on the use of workshop instructional facilities for teaching electrical installation and maintenance works to determine its effect on students' academic achievement and cognitive retention in Edo State technical colleges.

Purpose of the Study

The main purpose of this study was to determine the effect of utilization of workshop instructional facilities on students academic achievement and retention in EIMW in Edo State technical colleges-specifically, the study determined the:

1. Post-test mean scores of students taught EIMW with workshop instructional facilities and those taught without workshop instructional facilities; and
2. Retention mean scores of students taught electrical installation and maintenance works with workshop instructional facilities and those taught without workshop instructional facilities.

Research Question

The following research questions guided the study;

1. What is the achievement mean scores of students taught EIMW with workshop instructional facilities and those taught without workshop instructional facilities?

2. What are the achievement retention mean scores of students taught electrical installation and maintenance works with workshop instructional facilities and those taught without workshop instructional facilities?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

$H_{01:}$ There is no significant difference between post-test mean scores of students taught EIMW with workshop instructional facilities and those taught without workshop instructional facilities.

H_{02} There is no significant difference between the retention mean scores of students taught EIMW with workshop instructional facilities and those taught without workshop instructional facilities.

Method

The design of the study was quasi-experimental of pre-test, post-test non-randomized groups. The study was carried out in Government Science and Technical Colleges (GSTC) in Edo State in south-south Nigeria. The population of the study was 152 and consisted 130 males and 22 females. This was the number of National Technical College (NTC II) electrical installation and maintenance works (EIMW) students as at the time of carrying out this study. There are four technical colleges in Edo State. Two located in Edo north, one each in Edo central and Edo south senatorial district. Two of the technical colleges were purposively selected with a total number of 84, NTC II EIMW students. One intact class each was used in the two colleges selected. The class in the college Edo North was used as experimental group (36 students) while the class in the college in Edo South was used as control group (48 students).

The instrument for data collection was electrical installations and maintenance works achievement test (EIMWAT). The test items were drawn from National Business and Technical Examination Board EIMW past questions between 2009 and 2019 and it complied with table of specification according to the topics taught. It consisted 40 multiple choice test items with four options (A-D). The instrument was validated by three experts. The reliability of the instrument was determined by administering it to 24 NTC II EIMW students in the technical college in Edo central senatorial district who are not part of the sample but the population. Kuder-Richardson formula 21 was used to calculate the data obtained and it yielded r-value of 0.78. Data collected were analyzed using mean (X) scores to answer the research questions. Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance.

The group (experimental or control) with a higher mean score in the post-test and delayed post-test was considered to have achieved academically better. Similarly, if the P-value was less than 0.05 level of significance, the null hypothesis was rejected, otherwise it was retained.

Results

Research Question 1: What are the achievement mean scores of students taught EIMW with workshop instructional facilities and those taught without instructional facilities?

Table 1: Mean analysis of Post-test achievement scores of students in the experimental and control groups.

Groups	N	Pre-test mean $(\bar{X}_1)$	Post-test mean $(\bar{X}_2)$	Mean gain $\bar{X}_2 - \bar{X}_1$
Control	48	34.12	35.69	22.23
Experimental	36	32.00	57.91	

Table 1 reveals that the pre-test mean scores of the control and experimental groups are 34.12 and 32.00 respectively. Also their post test scores are 35.68 and 57.91 respectively. The mean gain is 22.23 in favour of the group taught EIMW with workshop instructional facilities. It means that the use of workshop instructional facilities had positive effect on students' academic achievement in electrical installation and maintenance works.
Research Question 2: What are the retention mean scores of students taught EIMW with workshop instructional facilities and those taught without workshop instructional facilities?

Table 2: Mean analysis of retention mean scores of students taught EIMW with workshop instructional facilities and those taught without workshop instructional facilities

Groups	N	Delayed post-test (retention) mean score	Mean Difference
Control	48	32.24	33.44
Experimental	36	65.68	

Table 2 shows retention mean scores of 32.24 for the control group and 65.68 for the experimental group with a mean difference of 33.41 in favour of the experimental group. This means that the use of workshop instructional facilities had a positive effect on students retention in electrical installation and maintenance works.

Testing of Null Hypotheses
H01 There is no significant difference between the post-test mean scores of students taught EIMW with workshop instructional facilities and those taught without instructional facilities.

Table 3:ANCOVA summary of effect of workshop instructional facilities on students achievement in EIMW.

Sources	Type II sum of squares	Df	Mean square	f-value	p-value	Decision

Corrected models	27655.462	2	13566.734	222.569	.000	
Intercept	3424.837	1	3424.837	54.322	.000	
Groups	10304.834	1	10304.834	306.769	.000	
Post test	9244.514	1	9244.514	146.338	.000	Rejected
Error	8665.487	81	65.725			
Total	299558.001	84				
Corrected total	32316.978	83				

Table 3 shows that for 1 df, the p-value is .000 this value is lower than 0.05 level of significance. This depicts that there was significant difference between the post test achievement mean scores of students taught electrical installation and maintenance works with workshop instructional facilities and those taught without workshop instructional facilities. Therefore the null hypothesis was rejected.

H_{02} There is no significant difference between the retention mean scores of students taught EIMW with workshop instruction facilities and those taught without instructional facilities.

Table 4: ANCOVA summary of the effect of workshop instructional facilities on students retention scores in EIMW

Sources Type II sum of squares	Df	Mean square	f-value	p-value	Decision
Corrected models	53657.411	2	26783.7055	1304.22	.000
Intercept	701.622	1	701.622	33.410	.000
Groups	3039.855	1	3039.855	142.566	.000
Post test	1464.225	1	1464.225	664.400	.000 Rejected
Error	2940.526	81	36.303		
Total	368386.000	84			
Corrected total	55456.123	83			

Table 4 depicts that at 0.05 level of significance for 1 df, the p-value was .000 which is lower than the level of significance 0.05. It means that there was significant difference in the mean retention scores of students taught electrical installation and maintenance works using workshop instructional facilities and those taught without workshop instructional facilities. Therefore, the null hypothesis was rejected.

Discussion of Results

The study revealed that students who were taught electrical installation and maintenance works using workshop instructional facilities scored higher in the post-test than students who were taught without workshop instructional facilities. The report of Fabiyi and Adetoro (2006), Olagunju and Abiona (2008), Umanadi (2009) and Hassan and Babawuro (2013) are in line with this finding. In their separate reports, the authors asserted that the use of workshop instructional facilities could have a significant effect on students academic achievement in science and technology related courses. This improvement in academic performance in EIMW as shown in this study could be as a result of the active involvement of students in the teaching and learning processes through the use of learning facilities.

Also, the study revealed that students taught EIMW with workshop instructional facilities retained more knowledge and understanding of the concepts than those taught without workshop instructional facilities. This agrees with the findings of Agina-Obu (2005) and Okoro (2008) which reported that learners remember most of the concepts they are taught if instructional facilities are used by the teachers. However, Nwadiani and Ugolo

(2011) reported that students' cognitive retention of concepts are determined by several factors including the teaching method employed by the teachers.

On the significant difference between the academic achievement of students taught EIMW with workshop instructional facilities and those taught workshop instructional facilities, the study found significant difference in favour of students taught with instructional facilities. This findings supports those of Adekola (2016) who maintained that there is a relationship between the utilization by teachers of instructional materials and academic performance of students in skill-based examinations. This has created a vicious cycle in the teaching of skill-based courses such as electrical installation and maintenance works in technical colleges in Edo State. This is in agreement with Bajah (2015), Tanner and Tanner (2012), McKenzie (2014) who agrees that the success of a curriculum largely depends on the effective utilization of instructional facilities by qualified teachers handling it and hence the academic performance of students.

It was found in this study that students taught EIMW with workshop instructional facilities perform better in the second (delayed) post-test than those taught without workshop instructional facilities. This finding is supported by the reports of Nwadiani and Ugolo (2011) and Agina-Obu (2005). Both authors reported that the use of instructional facilities enable the teacher to concretized concepts taught. The scholars added that students taught with physical objects are able to retain and recall the concepts they have learnt better than those taught without instructional facilities.

Conclusion

The findings of this study has shown that the use of workshop instructional facilities by teachers to teach electrical installation and maintenance works is able to improve on students' academic performance. Therefore, it was concluded that workshop instructional facilities if properly utilized has the potential of improving students' academic performance and cognitive retention in electrical installation and maintenance works.

Recommendations

Based on the findings of this study, the following recommendations are made

1. Electrical installation and maintenance works teachers in technical colleges should use workshop instructional facilities to enhance students academic performance and retention.
2. Electrical installation and maintenance works students should use available workshop instructional facilities for group works, projects and assignments since the facilities enhance academic performance and cognitive retention.
3. Technical colleges management should encourage technical teachers and students to use workshop instructional facilities by providing the facilities in the right quantity and qualities.

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