EFFECT OF DEMONSTRATION TEACHING MEHTOD ON STUDENTS' ACADEMIC PERFORMANCE IN BASIC ELECTRICITY IN TECHNICAL COLLEGES IN EDO STATE

By

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Abstract

The study investigated the effect of Demonstration Teaching Method (DTM) on students academic performance in basic electricity (BE) in Government Science and Technical Colleges (GSTC) in Edo State. Three research questions guided the study and three null hypotheses were formulated and tested 0.05 level of significance. Quasi experimental research design of non-randomized control group was the method used to carry out the study. Population of the study was 180 NTC II basic electricity students. Sample of 86 was purposively selected and studied. Instrument for data collection was Basic Electricity Achievement Test (BEAT). The instrument was validated by three experts with a reliability coefficient of 0.78. Mean (x) was used to answer the research questions while analysis of Covariance (ANCOVA) was used to test the null hypotheses. Findings showed that students taught basic ***electricity*** *with demonstration teaching method performed significantly better than students taught with lecture method. Also, it was revealed that the academic performance of male and female students taught basic electricity with demonstration teaching method was not significantly different from those taught with lecture teaching method. Consequently recommendations were made based on the findings.*

Keywords: Demonstration teaching method, Academic performance.

Introduction

One of the greatest means that could be used to achieve quick, desirable and sustainable change that could bring about economic, political, sociological and human resource development is education. The very unique aspect of Nigerian education system that is aimed at achieving these goals is vocational and technical education. This aspect of education is implemented at different levels: basic, post basic and tertiary. Technical colleges belong to the post basic level.

Technical College, now known as Government Science and Technical College (GSTC) is a specialized institution of learning where trades and modular courses are offered in addition to general education and science subjects. It is a post basic institution established by Federal and State Governments to implement vocational education programmes at that level. The graduates of GSTC are expected to be equipped with knowledge, understanding and skills that would make them to either be employable in the industry or be self-employed. The establishment of GSTC was not only to improve the skill acquisition but also to encourage occupational development (Ugwu, 2007). According to Pugate (2010) the future of any nation lies on the knowledge, skills, and abilities which the citizens are expected to acquire from technical education. The levels of knowledge, skills, and abilities acquired by students are measured by their academic performance.

Academic performance of students in basic electricity is the measure of their achievement in both theory and practical. Students' academic performance is determined by an achievement test which should cover the three domains of learning, namely: cognitive, psychomotor and affective. Student's level of academic performance is of a great concern to stake holders in education. Many authors have proved in their studies that intelligence is not the only determinant factor responsible for students' academic performance. Personality and cognitive abilities are other factors that can be useful predictors of students' academic performance (Busato et al, 2000; Chamorro-Premuzic and Furnham, 2003). This assertion seems to be true for all subjects offered in GSTC such as basic electricity.

In studying students' academic performance, gender cannot be ignored. In fact, difference in academic performance due to gender is of paramount importance to the educationists. According to Lee (2001), gender is an ascribed attribute that socially differentiates feminine from masculine. It connotes male and female or boys and girls in a given group of students. There is a general belief that boys are superior to girls in terms of cognition and logical reasoning as a result of certain factors and even superior in academic reasoning (Anigbogu, 2002). But Ojikutu (2005) disagrees with this claim. The author posited that difference in academic performance between male and females students does not exist. For instance, Okeke (2003) identified sex role stereo-type, masculine nature of science, female inability to withstand stress, as causes of difference in academic performance between male and female students. The influence of these factors seems to be more evident in sciences and science related courses. In support of this fact, Njoku(1997) posited that sex-role, stereo-typing could be the origin of the difference in performance between males and females in technical and science education. Apart from investigating the effect of demonstration teaching method (DTM) on students' academic performance in basic electricity (BE), this study is designed to also examine the influence of gender on the academic performance of technical college students in basic electricity when the DTM is used as a teaching method.

Basic electricity is one of the trade related subjects offered in technical colleges in Nigeria (NABTEB, 2007). It is a core subject in technical college curriculum and is offered by all students studying Automobile Technology, Metalwork Technology, Woodwork Technology, Building Construction Technology, Electrical/Electronic Technology and Home Economics.

In NTC examination conducted by NABTEB, basic electricity are in two paper's. Paper I, coded 194 – 1 and paper II, coded 194 – 2, theory and practical respectively. It means that students' performance in basic electricity is based on the combination of their achievement in both practical and theory papers. Therefore, students must be taught with methods that will involved them actively in the teaching-learning process. According to Ohiakhuare (2009), if students must be skilled in electrical wiring, circuits and accessories, they must be taught with relevant tools and materials for wiring. The learners have to practice and not only merely observers. Students who are skilled in this area could perform well in their examinations and in the world of work.

In recent years, students' academic performance in basic electricity NTC examination in technical colleges in Edo State have not improved significantly. Records available showed that the performances of students in BE from 2014 to 2017 were below 45%. This situation calls for worry. Could it be as a result of the persistent use of lecture teaching method by teachers? This method can only equip the students' for the theory of examination which alone cannot produce good results.

Lecture teaching method is the verbal presentation of ideas, concept, generalization and facts. It is characterized by a talking, that is teacher standing in front of the students with occasional use of the chalk/marker and the black board/white board while the students are with their notebooks and other writing materials to take important points down. The lecture method which is equally known as the chalk and talk method is teacher-centred, content-driven and learner passive method. It does not give opportunities for students to participate and interact in the classroom except at the end of the lessons where the students are asked questions or they have questions to ask or further clarification on some aspects of the teaching.

According to Salawa (2001) lecture teaching method is a method of learning regarded as the vehicle through which a message is delivered between students and teacher and vice versa. Ukoha and Eneogwe (2001) define the lecture method to involve a formal discourse or exposition of a subject matter to attain stated instructional objectives. The authors noted that the lecture method is a one-way communication affair, which is autocratic and encourages students' passivity, rote learning and inappropriate for encouraging students to think for themselves.

In a related view, Okoro (2004) described the lecture method as a process in which the teacher or some other knowledgeable person supplies information to the students. Lecture teaching method does not encourage students' active participation in the class, it may lead to lack of interest on the part of the students. It encourages cramming of facts which students may not be able to recall correctly. However, lecture teaching method is not without some advantages. For example it is effective for managing large class size; it saves time and cheaper to use.

Rather than using lecture teaching method that does not encourage students active participation in the lesson and as such could lead to poor academic performance, teaching method that could improve students' academic performance in basic electricity would be the one that could equip them for both the theory and practical examinations. Such method is demonstration teaching method. Demonstration teaching method is an instructional strategy that challenges students to "learn how to learn," working cooperatively in groups to seek solutions to real world problems (Duch, in Adekoyaand Olatoye, 2011). It is the process of teaching through examples and this is done by teaching the learners on how to carry out an experiment or an act.

Ericson (2001) stated that the demonstration method has stood out as the most definite and viable means of instruction since the time vocational and technical education courses were introduced into the school system. The noted that the demonstration method is unfailing in developing and maintaining students' interest because it appeals to the sense of vision, skillful performance and manipulation of hands. Such manipulation always attracts attention and a desire to emulate the work of the teacher. It makes students to see immediate progress as a result of their effort. In collaboration with the above, Nwachukwu (2006) defined demonstration method as a teaching method that involves a process in which learners follow a manner of planned and organized steps. These steps make the method realistic, impressive and also more of true life experience where actual objects, good models or apparatus are used. The author emphasized that it is one of the very effective methods applied by teachers in achieving objectives of learning in real life situations.

According to Okoro (2004) for demonstration teaching method to be effective, the teacher should plan for it, that is prepare the students for the demonstration, carry out the demonstration properly,

review the demonstration processes and restate the important points connected. In a related term, Umar (2013) stated that the demonstration strategy consists of three successive phases which are:

i. Introduction: In this phase, a brief lecture in which the goals and the objectives of the lesson are stated. The teacher who is the demonstrator demonstrates the activity before the students.
ii. Development: Students try to imitate the demonstrated activity, this phase features a good deal of questions and answers and the teacher tries to satisfy them by further demonstration and illustrations.
iii. Consolidation (integration phase): In this phase, the teacher integrates all the activities and the activities are rehearsed, revised and tested.

Variants of this strategy have been employed in realizing both cognitive and psychomotor objectives. This continues to be so whenever it is desirable to have students learn exact procedures. This method is used mostly in engineering, vocational and technical schools, teacher education programs and in industrial institutions.

The demonstration method has shown to be an effective teaching method in the fields mentioned above because it involves the use of the eyes, ears and the hands. It is generally believed that; what you hear, you tend to forget; what you see tends to last long in one's memory; while what you see, hear and do remains in the memory. This correlates the quote from Confucius, a Chinese philosopher and reformer "What I hear, I forget. I see and 1 remember. 1 do and I understand". Research have shown that, if these three senses come to play in the teaching and learning process, they help the learners' retention and as such enhance academic performance. Newby et al in Adekoya and Olutoye (2014) suggested that teachers should allow students to use several senses by allowing them to see, hear and possibly experience. In support of the above, Carrier (2005), Pipric and Hadgraft (2009) found that students benefit immenselywhen they have the opportunity to interact with materials, participate in activities and manipulate objects and equipment. However, demonstration teaching method is time consuming and expensive. This teaching method might not be very effective if instructional facilities are inadequate.

Statement of the Problem

If there is conducive learning environment such as classrooms, good seating arrangement, equipped workshops and laboratories, instructional facilities in the right qualities and quantities and then qualified teachers, learners may not acquire the needed knowledge and skills if the right instructional method is not employed by the teacher. It means that teaching method is one of the strong factors that determine students' academic performance in all subject including basic electricity.

In the last decay, Edo State Government renovated the infrastructures in the four technical colleges and provided instructional materials. After that laudable effort by government available records showed that students' academic performance in basic electricity in NTC examinations in recent years did not improve. It was observed that technical teachers including basic electricity teachers are still using lecture teaching method. It seems that this teaching method that does not encourage students' involvement in the lesson is responsible for the lack of improvement in students' performance in basic electricity as in other related subject. The researcher is therefore worried that if urgent steps are not taken to check this trend, students may not improve on the academic performance in basic electricity. They may graduate with poor results that will not enable them gain admission into high institutions or gainful employment. Therefore, the researcher intends to experiment on the use of demonstration teaching if it will improve on students performance in basic electricity.

Purpose of the Study

The main purpose of this study was to determine the effect of demonstration teaching method on students' academic performance in basic electricity. The specific purpose were:

i. to determine the academic performance of students taught basic electricity with demonstration teaching method and those taught with lecture teaching method;
ii. to determine the academic performance of male students taught basic electricity with demonstration teaching method and those taught with lecture teaching method;
iii. to determine the academic performance of female students taught basic electricity with demonstration teaching method and those taught with lecture teaching method;

Research Questions

Three research questions guided the study.

i. What are the effects of demonstration teaching method and lecture teaching method on students' academic performance of students in basic electricity?
ii. What are the effects of demonstration teaching method and lecture teaching method on male students' academic performance in basic electricity?
iii. What are the effects of demonstration teaching method and lecture teaching method on female students' academic performance in basic electricity?

Hypotheses

Two hypotheses were formulated and tested at 0.05 level of significance.

i. There is no significance difference in academic performance between students taught basic electricity with demonstration teaching method and those taught with lecture teaching method.
ii. There is no significant difference in academic performance between male and female students taught basic electricity with demonstration teaching method.

Significance of the Study

The findings of this study are of immense benefit to all students including basic electricity students, technical teachers, government, curriculum planners, educationaladministrators, parents, employers of labour and the society in general.

The students will acquire relevant knowledge, ability and skills in BE through their active involvement in BE lessons. This will make them to become creative, reflective, competent, resourceful and self-confident. Students' achievement if enhanced will, thus, reduce persistence failure in public examinations and teacher - made test.

Similarly, the findings of this study, if implemented, will benefit the technical teachers. It is expected that if the technical teachers developed mastery in the utilization of the lesson plan for instruction, it will improve their skills in the use of student-centred approach such as demonstration teaching method. In so doing, it will assist to arouse the interest of the students to become confidentand trust their ability in performing practical work in basic electricity.

Moreso, government, curriculum planners and educational administrators stand to gain from the findings of this research work. The information provided could be employed by the government via the assistance of the curriculum planners that will facilitate the development of vocational and technical education in Nigeria. The findings from, this research work will equally benefit the industries, as there will be quality and competent BE graduates with requisite skills to perform, take decision and solve complex problems in the workplace. The money expended by the industries for retraining of graduates before their assumption of duties will be saved.

In the same vein, the society in general will also benefit from the findings of this research.There would be availability of competent, skilled and employable BE technicians to run ourindustries. The standard of living of the populace will improve because there will be improvement in

the standard of good product. This will resultantly boost the overall technological growth of the nation. When youths become employed, desperation and idleness will be minimized, and crime rate will drastically be reduced in the society.

Finally, the findings of this study will bring succor to the parents as their children will become skilled BE graduates who can secure good jobs or be self-employed, instead of being a liability to their parents after graduation. By extension, the standard of lively-hood will improve among the people and the state of the economy also improved.

Scope of the Study

This study focused on the effect of demonstration teaching method on students' academic performance in Basic Electricity (BE) in technical colleges in Edo State. The study was delimited to technical college NTC II students. It covered four topics namely: conductors and insulators, OHM's law and its application, Resistors, Capacitors, and Inductors and Values and Functions of Resistors.

Method

The research was carried out using quasi-experimental design of pre-test, post-test non-randomized control group. It involved two groupsdemonstration teaching method and lectureteaching method and there were pre-test and post-test for both groups. According toNworgu (2015) quasi experimental study does not allow for randomization of subjects to experimentaland control groups. This design was considered suitable for the study because there was no room forrandomization. Intact classes were used to avoid disruption of normal class lesson.

The population of the study was 180 technical students (NTC 11) offeringbasic electricity in the four technical colleges in Edo State and it comprised 153 males and 27 females. The NTC II students were chosen because they are the prospective candidates for NTC public examination conducted by NABTEB. The sample of the study was 86 BE students. Purposive sampling technique was used to select two technical colleges for the study based on willingness of BE teachers to participate in the study as research assistants.

From the four technical colleges, two intact classes in the two technical colleges selected were used. One technical college (Uromi) for the experimental group because it has the facilities for using demonstration teaching method. The other college (Benin) was used as control group. The experimental class consisted of 24 students (18 males and 06 females) and the control class consisted of 62 students (44 males and 18 female).

The instrument used for data collection was BE achievement test. The test contained 40 multiple choice test items with options (A – D) which were selected with the aid of table of specification and adapted by the researcher based on NABTEB past questions between 2008 – 2017. The instrument was validated by three exports. Kunder-Richardson formula 20 was used to calculate the reliability coefficient and it yield 0.78.

Results

Table 1: Summary of Pre-test and Post-test BE performance mean scores of students taught with demonstration teaching method and those taught with lecture method.

Source of Variation	*N*	*Pre-Test Mean score*	*Post-Test Mean score*	*Difference in Mean*	*Remark*
Demonstration teaching method	24	30.81	66.83	36.00	More effect
Lecture teaching method	62	27.34	49.03	21.69	

Table 1 indicates that the students taught basic electricity using demonstration teaching method had pre-test mean score of 30.81 and post-test mean score of 66.83 with a difference of 36.00. Whereas those taught with lecture method had pre-test mean score of 27.34 and post-test mean score of 49.03 with mean difference of 21.69. Demonstration teaching method is effective in enhancing students performance in basic electricity.

Table 2: Summary of Pre-test and Post-test BE performance mean scores of male students taught with demonstration teaching method and those taught with lecture-demonstration method

Source of Variation	*N*	*Pre-Test Mean score*	*Post-Test Mean score*	*Difference in Mean*	*Remark*
Demonstration teaching method	19	29.73	65.84	36.11	No difference in effect
Lecture teaching method	5	35.00	70.60	35.60	

Table 2 reveals that the male students taught basic electricity with demonstration teaching method had pre-test mean score of 29.73 and post-test mean score of 65.97 with mean difference of 35.24. Whereas, the group taught basic electricity with lecture method had pre-test man score of 35.00 and post-test mean score of 70.00. But the difference in their man gain was 0.24 in favour of demonstration teaching method. It means the effectiveness of demonstration teaching method on male students in basic electricity is slightly higher than that of lecture teaching method. In other words, the effect of demonstration teaching method on male students academic performance is not difference from the effect of lecture method on male students academic performance in basic electricity.

Table 3: Summary of Pre-test and Post-test BE performance mean scores of female students taught with demonstration teaching method and those taught with lecture-demonstration method

Source of Variation	*N*	*Pre-Test Mean score*	*Post-Test Mean score*	*Difference in Mean*	*Remark*
Demonstration teaching method	7	41.57	77.14	35.57	
Lecture teaching method	17	27.47	62.59	35.12	More effective

Table 3 shows that female students taught basic electricity with demonstration teaching method had 41.57 in the pre-test mean score and 77.14 in the post-test mean score with a mean difference of 35.57. Female students taught electricity with lecture method had 27.47 in the pre-test mean score and 62.59 in the post-test mean score with mean difference of 35.12. It means that lecture teaching method improved on students mean score from 27.47 (failed score) to 62.59 high score, whereas, demonstration method from pass mean score of 41.57 to 77.14. It means that lecture teaching method is more effective in improving female students academic performance in basic electricity.

Testing the Null Hypotheses

Hypothesis 1: There is no significance difference in academic performance between students taught basic electricity with demonstration teaching method and those taught with lecture teaching method.

Table 4: Summary of ANCOVA on the academic performance Post-test mean scores of students taught with demonstration teaching method and those taught with lecture teaching method

Source of variation	SS	df	MS	Cal. F	P-value	P ≤ 0.05
Corrected Model	*5972.670*	*2*	*2986.335*			
Intercept	8245.268	1	8245.268			
Post-test	489.939	1	489.939			
Treatment	4414.532	1	4414.532	118.68	0.00	S
Model						
Error	3087.330	83	37.197			
Total	259836.000	86				
Corrected Total	9060.000	85				

Table 4 depicts that at 0.05 level of significance 1df numerator and 85df demonstration,. The calculated F is 118.68 with a P-value of 0.00 which is less than 0.05. Therefore, the first null hypothesis is rejected. So, the effect of demonstration teaching method on students' academic performance in basic electricity is significance.

Null hypothesis 2: There is no significant difference in academic performance between male and female students taught basic electricity with demonstration teaching method.

Table 5: Summary of ANCOVA on the Post-test academic performances of male and female students in basic electricity taught with demonstration teaching method

Source of variation	SS	df	MS	Cal. F	P-value	P ≤ 0.05
Corrected Model	*249.955*	*2*	*124.977*			
Intercept	3621.331	1	3621.331			
Post-test	160.348	1	160.348			
Gender	30.380	1	30.380	0.430	0.519	NS
Error	1483.379	21	70.637			
Total	108934.000	24				
Corrected Total	1733.333	23				

Table 5 reveals that at 0.05 level of significance 1df numerator and 23df demonstrator, the calculated F is 0.430 with P-value of 0.519 which is greater than 0.05. Therefore, the second null hypothesis is accepted. So, the difference in the effectiveness of demonstration teaching method on the academic performance of male and female students' in basic electricity is not significant.

Discussion of Findings

Findings from the study revealed that students taught basic electricity using demonstration teaching method performed significantly higher in their post-test scores than those taught with basic electricity with lecture teaching method. This is in conformation with the findings of Erison (2001) who reported that demonstration teaching method has stood out as a viable and effective method of instruction for technical and vocational subjects since it was were introduced into the curriculum of education.

Also, Nwachukwu (2006) reported that demonstration teaching involved planned and organised steps. The author added that the steps make the method to be realistic and could improve on students' academic performance. The findings of Prfiric and Hadgratt (2009) highlighted the benefits of demonstration teaching method as also revealed in this current study that the method gives the opportunity to students to interact with materials, participate in activities, manipulate objects and equipment. The authors added that such interaction enable students to concretised the concepts learnt and thus could lead to academic improvement.

The effect of demonstration teaching method on male students academic performance in basic electricity is not different from the effect of lecture teaching method on male students academic performance in basic electricity. This findings is supported by the findings of Busato et al; Chamorro Premuzic and Furnham, (2003). Both authors agreed that students academic performance is not only based on teaching method but students personality and their cognitive ability.

The difference in the effectiveness of demonstration teaching method on the academic performance of male and female students in basic electricity is not significant. In agreement with this finding, Ojikutu (2005) reported that difference in academic performance between male and female students does not exist. However, the reports of Anigbagu (2002) boys are superior to girls in terms of cognition and logical reasoning as a result of certain factors does not support this finding.

Conclusion

Based on the findings of this study, it was concluded that demonstration teaching method is an effective method in the teaching of basic electricity. Therefore, demonstration teaching method could be used in the teaching and learning of basic electricity to enhance students' performance, mastery of basic electricity knowledge and skills.

Recommendations

From the findings of this study, the following recommendations were made:

i. Basic electricity teachers in Government Science and Technical Colleges (GSTC) should use demonstration teaching method in teaching basic electricity to enhance students' mastery and academic performance.
ii. Government Science and Technical College administrators should provide instructional facilities for using demonstration teaching method.
iii. Basic electricity teachers should be given opportunities for in-service training to equip them with the skills required in the use of demonstration teaching method for teaching basic electricity.

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