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Effect of Multimedia-enriched Lecture Method on Academic Performance of Public Secondary School Students in Physics in Kano Metropolis, Nigeria.

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Abstract
This study investigates the impact of multimedia-enriched lecture method on academic performance of secondary school students in Physics in Kano Metropolis Nigeria. Two research questions guided the conduct of the study. A Quasi-experimental Pretest, Posttest, Research Design was used. The population of the study consisted of 13650 SSII students of public secondary schools in Kano State. Four schools were randomly sampled consisting of 240 students with sixty students in their intact classes participated in this study. Physics Academic Performance Test (PAPT) with a reliability coefficient of 0.83 was used for data collection. The experimental group was taught Physics concepts using multimedia-enriched lecture method (MELM) while the control group was taught the same physics concepts using conventional lecture method (LM). Mean and standard deviation was used to analyse the data. Findings reveal that (i) there was a difference in academic performance between students exposed to multimedia-enriched lecture method and those exposed to conventional lecture method. It was thus concluded that multimedia-enriched lecture method improves performance of secondary school Physics students, and it was recommended among others that the multimedia-enriched lecture method should be employed to teach Physics to secondary school students.

Keywords: Multimedia-enriched lecture method, Academic Performance, Gender, Physics, Secondary School

Introduction

Science is regarded as an instrument par excellence for solving socio-economic problems of various kind and has helped to meet the minimum needs of human society in terms of food, shelter, clothing, water, energy, employment, basic education, transportation health care (Bent & Brink, 2013). Physics is one of the science subjects upon which the bulk of the present day technological breakthroughs are achieved (Brenda, 2013). Due to its significance in science and technological development, Physics is made a core course in science curriculum. Physics is taught using various methods and the dominant method of teaching is lecture method (Atadoga 2008). Despite its importance, the performance of students in Physics at foundation level has not been encouraging (Zendesha & Fidelis 2012). The observed poor academic performance has been linked to ineffective teaching strategies employed by Physics teachers according to Zendesha & Fidelis (2012). Several alternative teaching strategies have been

employed to address the poor performance issue among which is using multimedia enriched lecture method. One questions raised in this research is how effective is the multimedia enriched lecture method on students' academic performance in Physics in area of study?

Alberk (2011.) view multimedia as the exciting combination of computer hardware and software that allows one to integrate video, animation, audio graphics and text resources to develop effective presentation to an affordable desktop computer. Ashley (2013) opines that multimedia is characterized by the presence of text, pictures, animation and video, some or all of which are organized into some colorant programme. However, today's multimedia is a carefully crafted combination of text, graphic, sound animation and video elements among others that allow for the benefit of the end user. Where the viewer of a multimedia project has to control on 'What?', 'When?' and 'How?' the elements (learning materials) are presented, it is referred to as interactive multimedia (Berk, 2009).

Multimedia can also be defined as an integration of multiple media elements (audio, video, graphic, text animation among others) into one strong and symbiotic whole that results in more benefits for the end user than any of the media element can provide individually. Berk (2009), states that when a movie watched, TV programme, and video clips among others, superficial or deep emotions are elicited such as excitements, relaxations. These emotions are triggered by the mode created by certain visual sense. Using video clips as instructional tools in nearly all subjects increase students understanding and provide them with powerful cognitive and emotional impact that can help the students in the development of a permanent learning outcome (Anita, 2009).

Statement of the Problem

Physics as a science subject in secondary schools in Nigeria faces several problems such as poor academic performance, ill-equipped laboratories and ineffective teaching methods among others (Nwafor 2017). A brief look at students' performance in Physics in Kano State, which is the most populous state in Nigeria is presented in Table 1 for study.

Table 1: Students' Performance in SSCE (WAEC) in Physics From 2007 - 2016 in Kano State.

Year	No. of candidates	No. of credit	% Credit	No. of pass	% Pass	No. of fail	% fail
2007	6789	615	9.06	957	14.10	5316	78.30
2008	7963	167	2.10	1197	5.00	6600	82.90
2009	8030	91	1.13	825	10.2	7114	88.60
2010	21212	448	2.10	2174	10.20	18690	87.70
2011	8105	924	11.40	3542	43.70	3639	44.90
2012	10292	3170	30.80	6844	66.50	278	2.700
2013	11855	733	6.15	6422	53.85	4770	40.00
2014	13946	2241	16.07	4333	31.07	7372	52.86
2015	15092	2309	15.30	4798	31.79	7985	52.91
2016	17128	4097	23.92	8263	48.24	4768	27.84

Source: Kano Educational Resource Department, 2016

According to the result in Table 1, performance has been less than 40% for five out of eight year result presented was worrisome. The poor performance has been attributed to some problems such as use of ineffective teaching methods, inadequate teaching facilities such as multimedia materials (Salima 2010, Sharma 2013, Stephen 2017). The poor performance has also been viewed to have gender dimension in the study area (Stephen 2017). Based on the problems identified, multimedia enriched lecture method was tested to find out whether the method could effect on students' academic performance on Physics students in the study area.

Objectives of the Study

The main aim of the study was to find out whether multimedia enriched lecture method would have any significant effect on students' academic performance among senior secondary school students in Kano Metropolis, Nigeria. Specific Objectives of this study were to:

1. determine the difference that exists in performance between students taught Physics concepts using multimedia-enriched lecture method and those taught Physics concepts using conventional lecture method among secondary students in Kano Metropolis, and
2. Determine the effect of multimedia-enriched lecture method on academic performance in Physics between male and female students in Kano Metropolis.

Research Questions

This study answers the following research questions:

1. What is the effect of multimedia-enriched lecture method and conventional lecture method on academic performance in Physics among SSII students in Kano Metropolis?

2. What is the effect of multimedia-enriched lecture method on academic performance in Physics between male and female SSII students in Kano Metropolis?

Methodology

The research design was Quasi Experimental/Control group pre-test, posttest design. An intact class of an average of sixty students from four sampled schools participated in the research to avoid inconveniences due to randomization. Four groups of students were used for both the experimental group and the control group (i.e. two experimental groups and two control group). The four groups were given a pre-test and post-test exercises. The post test came up after both the experimental group (EG) and the control group (CG) received the treatment.

Two instruments were designed by the researchers. The instruments are Physics Academic Performance Test (PAPT) and multimedia enriched lecture lesson plans. The instruments were validated by three senior lecturers from Ahmadu Bello University. PAPT was pilot tested and its reliability was determined using Kr 20 formular to be 0.83. A test retest method was used to determine the reliability coefficient of the instrument. PAPT test items consists of 40 multiple choice objectives questions structured based on the concepts taught. The test questions were adopted from the West African Examination Council (WAEC) past examination question papers. The scoring of the test items was 2.5% for each correct answer.

Lessons for experimental and control group lasted seven weeks. The concepts selected for this study are; speed, velocity and acceleration. At the end of the treatment, a post test (0_2) was administered to both the EG and CG to evaluate the effectiveness of the two teaching strategies in the academic performance in Physics concepts learning. The research design is presented in Figure 1.

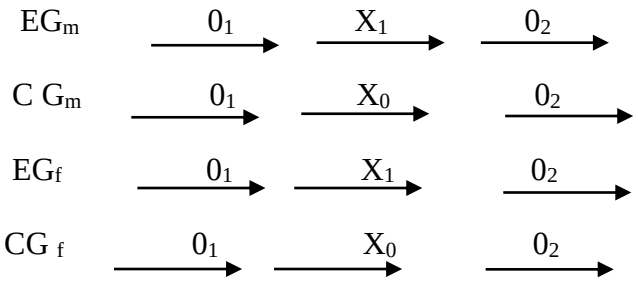

Figure1: Research Design

Where: EG_m = Experimental Group Male

CG_m = Control Group Male

EG_f = Experimental Group Female

CG_f = Control Group Female

0_1 = Pretest

X_1 = Treatment using Multimedia-enriched lecture method

X_0 = Treatment using Traditional Lecture Method

0_2 = Post test

The population of this study consists of SS II students of 10 public secondary schools in Kano Metropolis which stood at 1,365 out of which seven hundred and fifty nine (759) were male while six hundred six (606) were female. Kano metropolis was chosen because it comprise of students from different cultural backgrounds in Nigeria which could make generalization of from the research more loudable. Out of ten secondary schools in the study area, four schools were randomly selected taking care of gender. From the four sampled schools, intact classes of about 60 student each participated in the study. The sample of this study consists of 240 SS II students which were divided into two groups (the experimental group and the control group).

Table 2. Sample for the Study.

S/N	Status	Gender	sample
1.	Experimental group	Male	63
2.	Experimental group	Female	57
3.	Control group	Male	66
4.	Control group	Female	54
	Total		240

Results

Answering the Research Questions:

Research Question 1: What is the effect of multimedia-enriched lecture method and lecture method on academic performance in physics concepts among SSII students in Kano Metropolis?

To answer this research question, post test data were subjected to descriptive statistics and mean scores and the standard deviation of the two groups were calculated as shown in Table 3.

Table 3: Pretest and Posttest mean scores for Experimental and Control groups

Variables	**N**	**Pretest Mean Score**	**Posttest Mean Score X**	**SD**	**Mean difference**
Experimental	120	40.24	66.67	26.20	26.66
Control	120	39.13	40.01	01.13	

From Table 3.0, the mean pretest scores on PAPT for Experimental and Control groups were 40.24 and 39.13 respectively while the post test scores were 66.67 and 40.01 respectively. The mean difference between the post test scores for experimental and control scores was 26.66. The difference in the score was in favour of the experimental group which could be attributed to the treatment administered to the experimental group. The difference implies that use of multimedia –enriched Lecture method was effective in enhancing academic performance on Physics among secondary school students in Kano Metropolis Nigeria.

Research Question 2: What is the effect of Multimedia-enriched lecture method on Academic performance on Physics between male and female students in Kano metropolis?

To answer this research question, the post test data of the Experimental Group exposed multimedia-enriched lecture method were sorted out according to gender and subjected to descriptive statistics. Summary of analysis is shown in Table 4.

Table 4: Posttest Mean Scores and Standard Deviation of Male and Female Experimental Group (EG) Expose to Multimedia Instructional Strategy (MELM)

Gender	N	MEAN	SD	MD
MALE	60	67.23	1.05	
				0.05
FEMALE	60	66.17	1.25	

From Table 4, the mean score of the male Experimental Group (EG) was 67.23 with a standard deviation (SD) of 1.05 while the female experimental group (EG) has a mean score of 66.17 and a standard deviation (SD) of 1.25. The mean difference between the two groups being 1.06 which is small, showing that gender does not affect performance very much when they taught Physics using Multimedia-enriched lecture method. This implies that the teaching approach was gender friendly.

Major findings

Based on the results of the study, the following were the major findings of this research :

1. Multimedia-enriched lecture method was found to be effective in enhancing academic performance of Senior Secondary School Physics students in Kano Municipal Nigeria
2. Effectiveness of Multimedia-enriched lecture method was found to be gender friendly

Discussion of Results

The first major finding which showed that multimedia-enriched lecture method was effective in enhancing students' academic performance agrees with the findings of Shah & Khan (2015), De Sousa, Richer & Nel (2017) and Kareem (2018). According to Shah & Khan, multimedia teaching was effective in enhancing achievement and attitude at elementary level while De Sousa et al (2017) found that the strategy could address unique nature of social science at tertiary level effectively. According to Kareem (2018) multimedia instruction aided better performance among students learning Biology students. The effectiveness of the multimedia approach could be because the approach employs several senses of the learner which could better assimilation of what is taught and learnt by the student which may enhance better academic achievement on what was learnt. The second finding which showed that both male and female students performed equally good when taught using multimedia-enriched lecture method disagrees with the findings of Nusi,Alsmadi,Al-kabi & Sharadgah (2013), Ercan (2014) and Ibrahim (2016). Nusir et al (2013) found no significant difference in learning base on gender while Ercan (2014) found difference in academic achievement among students learning science base on gender in favour of females. Ibrahim (2016) found multimedia enhanced teaching not gender friendly among students learning Chemistry. The no difference findings could be due no difference in the makeup of male and females brains. Where differences exist could be due to different societal roles assigned to male and females.

Conclusions

Based on the findings of this study, it can be concluded that Multimedia-enriched lecture method is effective in improving academic performance of senior secondary school students in Physics and the strategy is gender friendly.

Recommendations

Based on the findings from this study, the following recommendations are made:

1. The teaching of Physics should be done such that students learn effectively and retain the concepts they have learned. The use of the multimedia-enriched lecture method seems to be appropriate for this. Therefore, it should be incorporated into the main stream of Physics instructional strategies.
2. Training programmes for serving teachers in form of seminars, workshops and conferences should focus on the use of multimedia-enriched lecture method in the teaching and learning of Physics.

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