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EFFECT OF POWERPOINT INSTRUCTIONAL PACKAGE ON SECONDARY SCHOOLS STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY IN ENUGU STATE, NIGERIA

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ABSTRACT

The quest to achieve effective teaching and meaningful learning in Biology prompted the study on effect of PowerPoint instructional package (PIP) on the academic achievement of Senior Secondary two (SSII) students in Biology in Enugu State, Nigeria. The study was guided by four research questions and six null hypotheses. A quasi-experimental research design especially, the non-randomized control group design was adopted for the study. A total of 195 SSII students was sampled for the study using multistage sampling procedure. The instrument for the study was Biology Achievement Test (BAT). The instrument was validated by three (3) experts from faculty of Education Nnamdi Azikiwe University, Awka. Kudder-Richardson Formula 20 was used to establish a reliability coefficient of 0.78 for BAT. Both experimental and control groups were taught Biology for four weeks using PIP and conventional lecture method (CLM). The BAT was administered as pretest and post-test at different times for data collection. Mean and standard deviation were used to answer the research questions, while ANCOVA was used to test the null hypotheses at .05 alpha level. The findings revealed that PIP significantly enhanced the achievement of students in Biology more than CLM. Also, there is no significant difference on the effect of PIP on academic achievement of male and female students in Biology. Based on the findings it was recommended among others that; Biology teachers should adopt PIP when teaching Biology to enhance students' interaction with each other and the learning materials to facilitate achievement in the subject.

Keywords: PowerPoint Instructional package, Achievement, Biology.

Introduction

Biology is an integral part of science and is one of the core foundational science subjects. Students are usually exposed to the subject in order to prepare them for future scientific explorations and endeavors. Biology is a very important subject in the field of science and has been linked to most human activities including those of food, water, health, ecosystem management, agriculture and conservation, amongst several others (Amonsa and Bassey, 2017). Biology literacy has, therefore, become

relevant for everyone all over the world because of the awareness it brings.

Due to lofty benefits in learning Biology, Arukoya and Chukwu (2017) stated that the subject has popularity among students and as a result, has high students' enrolment in external examinations when compared to other science subjects in Nigerian secondary schools. Despite its popularity and simplicity as viewed by students, percentage pass recorded over years has not been encouraging. This agrees with the earlier observations of Osuafor and Okonkwo (2013) and Agboghoroma and Oyovwi (2015) that the performance of biology students in external examinations such as West African Senior Secondary Certificate Examination (WASSCE) and National Examination Council of Nigeria (NECO) has remained unsatisfactory. By implication, it means that academic achievement of students in internal examinations in Biology is also poor.

Academic achievement is the outcome of education. It constitutes the extent to which a student, teacher or institution has achieved his/her educational goal. Accordingly, Bell (2012) described academic acheivement as the tendency to strive for success and to participate in activities in which success is dependent on a person's effort, skills, courage or perseverance and ability. Since excellent academic achievement depends on hard work, Wabuke (2013) advocated that a good education should be able to show the learner how to learn, how to remember, how to motivate and control ones learning, making the learner actively involved in the learning process, thus, enhancing their retention and academic achievement. To achieve this, it is therefore imperative that teachers employ innovative instructional strategies which can go a long way to enhance students' retention and hence, help them perform better when examination comes.

The achievement of students in Biology as revealed by both literature and WAEC Chief Examiners' Reports calls for concern especially for teachers of Biology that enroll larger number of students than other sciences. The problem has to a large extent been attributed to ineffective teaching method employed by the teachers especially lecture teaching method which is teacher-centered. Consequently, there is need to improve on the teaching and learning of Biology by exploring the use of some innovative learner mode of instructions such as PowerPoint instructional package, since it is believed that meaningful learning may be as a result of active participation by students.

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PowerPoint Instructional Package (PIP) is relatively new instructional strategy in which the topics to be taught are carefully planned, written and programmed in a computer, phone, tablets, laptops and other portable devices which could be ran at the same time in several units of such devices. The instructions are also programmed in a computer disc, flash drive, floppy disk, memory card or URL, which could be played in either audio or video system for the student to learn at his /her leisure time and at his/her own pace.

In general, the empirical evidence of the effects of Computer Assisted Instruction

(CAI) reveals that students taught with CAI could perform better than their counterparts taught with traditional teaching method. For instance, Kara and Kahraman (2008) compared the effects of CAI strategy and traditional method of teaching on students' performance. Their findings revealed that the students taught with CAI performed better than those taught with traditional instruction. Similarly, other researchers like Satyaprakasha and Sudhanshu (2014) found that multimedia instructional strategy enhanced achievement of senior secondary school students. If research studies carried out by Camnalbur and Erdogan (2008), and Alegre (2012) among others revealed that CAI package could improve academic achievement in some subjects, there is need to examine the effect of PIP on academic achievement of male and female students in secondary school in Biology.

Gender is an important variable that has been linked to academic performance in most parts of the world because of the culturally perceived role of males and females. This raises the issue of gender in relation to achievement. Influence of gender on students' achievement and retention in science subjects has over the years attracted the attention and interest of scholars. However, it is worthy of note that opinions and findings about the issue have been diverse. For instance, the Trends in International Mathematics and Science Study (TIMSS) data on gender of final year students among participating countries internationally revealed that male students perform better than their female counterparts in all participating countries except South Africa (TIMSS, 2007).

Several recent studies have shown that information technology approaches have a positive impacts on students' achievement in science (Ugwuanyi *et al*., 2019a, 2019b; Ugwuanyi and Okeke, 2020) , Mathematics (Onah *et al*., 2020) and Biology (Yusuf and Afolabi, 2010). However, none of those studies was conducted using PowerPoint instructional package (PIP). As a result, one can infer that in order to improve students' academic performance, contemporary instructional approaches involving technology (PIP) should be incorporated into Biology classroom teaching and learning. This work is necessitated by the need to assess the effect of PowerPoint Instructional Package on secondary school students' achievement in biology in Enugu Education Zone of Enugu State. Specifically, the study sought to determine the:

1. difference between the mean achievement scores of students taught Biology using PowerPoint instructional Package (PIP) and those taught using lecture method.
2. difference between the mean achievement scores of male and female students taught Biology using PIP and those taught using lecture method.

Research Questions

The following research questions guided the study;

1. What is the difference between the mean achievement scores of students taught Biology using PIP and those taught using lecture method?

2. What is the difference between the mean achievement scores of male and female students taught Biology using PIP and those taught using lecture method?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the mean achievement scores of students taught Biology using PIP and those taught Biology using lecture method.
2. There is no significant difference between the mean achievement scores of male and female students taught Biology using PIP and lecture method.

Research Method

The study adopted quasi-experimental research design. The population of the study comprised 4761 (2158 males and 2603 females) SS2 students offering biology in the 23 public senior secondary schools in Enugu Education Zone of Enugu State. The sample size of the study is 195 SS2 Biology students of 2022/2023 academic year. The selection of the sample was done in three stages using multi-stage sampling procedure. The instrument for the study is Biology Achievement Test (BAT). The instrument was used as pretest and posttest. The validation of the BAT was done by three experts, one in Measurement and Evaluation unit of the Department of Educational Foundation and two in Science Education, all from Nnamdi Azikiwe University, Awka. The reliability of the instrument (BAT) was conducted using a single administration method. This was done in Community Secondary School, Amansea in Anambra State, which is outside the area of the study. Scores from the BAT were used to estimate the reliability co-efficient of the instrument using Kuder-Richardson Formula 20 which yielded a reliability coefficient of 0.78. The researchers administered the research instrument personally with the help of four trained research assistants. Data collected were analyzed with respect to the research questions posed and the formulated hypotheses for the study. The test items in the pre-test and post-test were scored one mark each. The maximum mark was fifty (50) while the lowest mark was zero (0). Specifically, mean and standard deviation were used to answer the research questions while the null hypotheses were tested at 0.05 level of significance using analysis of covariance. The p-value was compared with alpha level ($\alpha = 0.05$) for appropriate decisions on the null hypotheses tested. Thus, a null hypothesis is rejected if P-value is less than or equal to 0.05 ($p \leq 0.05$); otherwise ($p > 0.05$) null hypotheses is not rejected.

Presentation of Results

Table 1: Mean Achievement scores of students taught Biology using PowerPoint Instructional Package and Lecture Method

Groups	n	Pre-test Mean	SD	Post-test Mean	SD	Gained Mean
Experimental	107	21.53	5.94	39.58	5.08	18.05
Control	88	24.80	7.94	39.10	5.24	14.30
Mean Difference		3.27		0.48		3.75

Table 2: Mean Achievement Scores of Male and Female Students taught Biology using PIP and lecture method

Gender	n	Pre-test Mean	SD	Post-test Mean	SD	Gained Mean
Male	92	22.03	7.58	40.24	5.06	18.21
Female	103	23.98	6.65	38.58	5.12	14.60
Mean Difference		1.95		1.66		3.61

Table 3: ANCOVA Test of Significant Difference between the Mean Achievement Scores of Students taught Biology using PIP and Lecture Method

Source	SS	Df	Mean Square	F	Sig.	Decision
Corrected Model	985.894[a]	4	246.474	11.270	.000	
Intercept	16601.809	1	16601.809	759.122	.000	
Pre-test	828.365	1	828.365	37.877	.000	
Gender	161.516	1	161.516	7.385	.070	Not Sig.
Method	131.889	1	131.889	6.031	.015	Sig.
Gender * Method	3.062	1	3.062		.709	Not Sig.
Error	4155.254	190	21.870			
Total	307300.000	195				
Corrected Total	5141.149	194				

a. R Squared = .192 (Adjusted R Squared = .175)

Discussion of Findings

Results in Table 1 reveal that the students taught Biology using PIP had pre-test mean achievement score of 21.53 and post-test mean achievement score of 39.58 with gained mean achievement score of 18.05, while those in the control group taught with lecture method has pre-test mean achievement score of 24.80 and post-test mean score of 39.10 with gained mean 14.30. This finding is supported by Agsalog (2019), who submitted that the use of power point instructional packages motivates the learners to learn and also is capable of increasing the learning gains of students in school subjects.

Table 2 reveals that the male students taught Biology using PIP and lecture method had pre-test mean achievement score of 22.03 and post-test mean achievement score of 40.24 with a gain in mean scores of 18.21 while the female students have pre-test mean achievement score of 23.98 and post-test mean achievement score of 38.58with a gain in mean scores of 14.60. This finding is supported by Nweke (2017), who submitted that Power point instructional package enhances student's achievement in geometry across gender and achievement level.

Table 3 shows that there is a significant difference between the mean achievement scores of students taught Biology using PIP and those taught Biology using lecture method (F=6.031, P =0.015 < 0.05). The hypothesis is hereby rejected. This finding is supported by Alkan (2016), who submitted that Power point instructional package increases students' achievement as well as their science process skill and hence, was recommended for implementation in the classroom. The engagements of these students with graphical developed animated materials become the source of the significant difference in academic achievement between the experimental and the control groups of students.

Table 4 also shows that there is no significant difference between the mean achievement scores of male and female students taught Biology using PIP and those taught using lecture method (F=7.385, P =0.070 > 0.05). The hypothesis is hereby not rejected. This finding is supported by Adeyemi and Awolere (2016), who asserted that the learning impact of power point instructional presentation is not users discriminatory.

The findings of the study revealed that the students taught Biology with PIP gained in achievement more than the students taught Biology with lecture method (LM). This difference in achievement is confirmed by the test of hypothesis which showed that there was a significant difference in the mean achievement scores of students taught Biology using PIP and those taught using (LM) in favour of those in the experimental group (PIP). This implies that PIP was found to be effective.

Conclusion

The study concluded that the adoption of PowerPoint Instructional Package (PIP) is an effective way of improving students' achievement in Biology irrespective of their gender. Because of the outcome of the study is clear to say that PIP is gender friendly that promotes students achievement and retention in Biology. Through this package, students' will understand the learning materials more and retain what has been taught for a period of time.

Recommendations

The following recommendations were made in the light of the findings of this study:

1. Biology teachers should adopt PIP while planning their lessons to enhance students' interaction with each other and the learning materials to facilitate effective learning and retention.
2. Curriculum planners should adopt PIP as an innovative teaching method in planning Biology curriculum.

3. The Science Teachers Association of Nigeria in collaboration with the government should organize seminars and workshops to train teachers on how to use PIP in teaching and learning of Biology and other science subjects.
4. Stakeholders should provide power point facilities for use in Biology lesson and in many subject areas.

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