EFFECTS OF VIDEO BASED INSTRUCTIONAL PACKAGE ON ACHIEVEMENT OF SECONDARY SCHOOL BIOLOGY STUDENTS IN SULEJA, NIGER STATE, NIGERIA

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Abstract
This study determined the effectiveness of video based instructional package on Biology students' achievementin mammalian skeletal, osmosis and diffusion. The influence of gender was also examined and Quasi- experimental design was utilized for the study, specifically the pretest, posttest, non-equivalent control group design was used. Purposive sampling technique was used in choosing co-educational secondary schools where intact class of' SS II Biology students was sampled. A total of 169 students sampled were assigned to experimental group and control group. The control group was taught using lecture method while the experimental group was taught using video instructional package. The experimental group comprised of 86 students (male and female) and the control group comprised of 83 students (male and female). Biology Achievement Test(BAT) was used to collect data.The instrument was validated by expert in the department of Science Education and also Kuder-Richardson 21 (KR-21) was used. Areliability coefficient of 0.80 was obtained. Two research questions were answered using mean and standard deviation while Analysis of Covariance (ANCOVA) was used to test the two hypotheses formulated at 0.05 level of significance. The findings of the study revealed that video based instructional package improved students' achievement in Biology. It is therefore recommended that video instructional package should be used to teach biology in secondary schools.

Keywords: *Achievement, Biology, Gender, Video Based Instruction, Video Package.*

Introduction

Learning is an activity that starts at birth and can be expected to continue for a lifetime. Both within and outside classrooms and training centres, learning takes place in well organized ways. Facilities and personnel are employed to provide an education designed for classroom learning, which aim to prepare all the students to work and participate in the society which they live in. Video is a medium of transmitting information in the form of sound and image to be displayed on the screen of television tube. Gambari & Gana, (2008) stated that Video Based Instructional (VBI) package is that aspect of multimedia that the student will be solely participating in the learning. Video package can be defined as an instructional media which gives the learner the privilege to participate, control and, study at a close pace until the learning is achieved. It also makes the teaching of difficult part of most topics easier for the teacher. Instructional video based package, when used as a teaching material in the sciences makes the practical side to be easy since students are conversant with topic to be practicalized as they participate and control the videos they watch. It can also be used to bring home the practical topics of biological science on the close observational aspect, making the teaching and learning of Biology to be more of student-centered. The VBI based package can enhance effective teaching and learning process as it helps to improve the teacher (instructor) and the student (learner) in the area of visual and listening. Interactive instructional package is an electronic based technology generally used as teaching material and it comprises of video being manipulated or controlled by the learner at his/her pace for effective learning. Therefore, it is an instruction that includes drill and practice, tutorials, simulations, instructional management and exercises which leads the students to high level of achievement.

Achievement is the amount of useful work accomplished by a student compared to the time and resources used. Achievement on the other hand can also be seen as a notable change in the students' academic attainment as a result of their exposure to the specific programme of instruction. Gana (2013) stated that achievement isreferred toas the acquisition and initial performance of learning items such that the learner easily makes use of the knowledge or skill acquired when the opportunity arise. Achievement is themajor focus of teaching and learning process which cannot be separated from performance because the acquisition of the learning item is useful when it can be put to use at any available opportunity. There are factors that can hinder successful achievement such as learning environment and personality traits such as motivation, interest, intelligence anxiety, extroversion, rigidity and reflectivity (Adeosun & Ayodele, 2008). Similarly, Ezekannaya and Ikeagu, (2004), stated that achievement is the differences in individuals' responses to success situation andsome traces for imminence failure is as a result of the factors that hinders

successful performance. This stated factors or situation can be overcome or minimized through engaging more achievement-orientated task like use of VBI package as means of better teaching and learning process .The persisting use of VBI package could avoid failure, exhibiting anxiety over failure when confronted with similar challenging tasks. Hence, achievement-oriented efforts are believed to result from two opposing tendencies which are; the tendency to achieve success and the tendency to reject failure (Gana, 2013). It can beseen that as one tendency increases its strength, the other is correspondingly decreasing. This phenomenon determines to some extent the level of achievement of each individual.

The poor achievement of students in biology can be attributed to many factors which include inappropriate implementation of teaching strategies and ineffective use of rightful instructional media, for example the use of traditional method of teaching known as conventional methodof teaching and learning alone has not been helpful in giving adequate learning of biology. Therefore, the use of innovating instructional teaching strategies as well as instructional media that will boost student's learning of biology more especially in the difficult areas of living cells has become imperative (Kareem, 2003). Hence, many technological teaching strategies have beendeveloped to improve students achievement in biology in Nigeria, among them is the method of using VBI package in Biology. Inadequate strategies of non-involvement of students inthe learning process by the teacher as well as lack of immediate feedback of each of the steps used in teaching and learning procedure also contribute to students' poor achievement in biology (Jegede, Okebukola, & Ajewole, 1992). The afore mentioned reason given indicates that, many biology subject teachers adopt already existing teaching strategies such as conventional teaching strategy without being innovative using new technology teaching packageswhich yield better students' achievement in learning which gives room for gender equity or gender friendliness.

The classrooms in Nigerian educational system are composed of boys and girls, a recurring theme among educators, especially science educators, and the society at large is gender equity or gender friendliness. The concept of gender has attracted the attention of many researchers. Gender issues have been linked with academic achievement in academic tasks. Results of study the area of gender disparity regarding academic achievement are not tailored towards the same direction. Some studies show that male students perform better than girls in physics, chemistry and biology (Olaofe, 2005; Adeniyi, 2005; Paul & Babalola 2006) while others revealed that female students are better than male. Gender influence on the use of VBI package has shown that female students perform better than male when introduced to video instructional package while other researchers observed that gender has no influence onthe performance of students when exposed to video based instructional package (Adeniyi, 2005; Paul, 2000). Hence effect of VBI package on boys and girls was aimed at finding out which gender group(s) benefits more than the other through video instructional strategy. The present study is an attempt to determine whether gender is an important variable in students' achievement. Based on the fore going, this study is carried out so as to find out what could be the effects of VBI package on achievement of secondary school biology students inSuleja, Niger state, Nigeria.

Aim and Objectives of the Study

The aim of this study is to find out the effects of Video Based Instructional Package in Senior Secondary Schools in Suleja, Niger State. The specific the objective sare to:

1. Determine the effect of VBI package on the achievement of biology students when exposed to VBI package and when exposed to lecture method in senior secondary schools, Suleja, Niger State.
2. Examine the difference inthe achievement of male and female biology students when exposed to VBI package in senior secondary schools, Suleja, Niger State.

Research Questions

To guide this study, answers were sought to the following research questions:

1. What is the mean achievement scores of biology students exposed to VBI package and those biology students exposed to lecture method?
2. What is the mean achievement score of male and female biology students exposed to VBI package?

Research Hypotheses

The following Null research hypotheses were formulated and tested at $p \leq 0.05$ level of significance.

HO_1: There is no significant difference in the mean achievement scores of secondary school biology students taught using video instructional package and those taught using lecture method.

HO_2: There is no significant difference in the mean achievement scores of male and female secondary school biology students' taught using video instructional based.

Research Methodology

This study adopted Quasi- experimental design, precisely pre-test, posttest, control group design. Intact classes were used since it is natural to use an already existing classroom in a school instead of creating a new classroom group through random selection and random assignment of subjects which might introduce extraneous variable known as experimental bias (Sambo, 2005). The dependent variable is the achievement of the students while the independent variable is the VBI package and the moderating variable is gender.

The population for the study was all the 35,659 Biology students in senior secondary schools in Suleja Local Government Area of Niger State 2014/2015 session. At the time of this study, Suleja Local Government Area had 28 public schools out of which four (4) schools were selected using purposive sampling technique this was due to constant light and adequate computers in the schools. The sample size of students used for this research was made up of 169 students from four purposively co-educational public secondary schools. The four schools were assigned into experimental and control groups using simple random sampling. The study adopted the use of intact class approach where all the students in each class were involved in the teaching and the testing sessions. Two schools of total number of 86 students were used as experimental group (by administering the treatment of using the VBI package) and the other two schools of total of 83 students were used for control group (by teaching the group using only lecture method).Thesample of the two groups comprised of 84 females and 85 male students from the two selected school type. Co-educational and single sex schools were used so as to properly determine gender differences in students' learning of biology using VBI package. A single stream of intact classes was selected using random sampling from the sampled schools and used for the study and these intact classes were subjected to test instrument before and after the teaching process.

The test instrument used for the study is Biology Achievement Test Instrument (BATI) that was made up of twenty-five (25) multiple choice items. This was drawn from Senior Secondary Certificate Examination (SSCE) past questions. Each test item had possible answers of options (A-E), only one of the five options was the correct answer. The items covered all aspects of mammalian skeleton, osmosis and diffusion of biology topics taught to the students. The students were required to answer all the twenty-five (25) questions, ticking the correct option out of the five options provided. The 25-item questions were scored one mark each, giving the total of 25marks which was converted to 100%.

A trial testing was conducted using 40 SS1 Biology students from another co-educational school beside the four sample schools used for the study. This was to ascertain the general suitability of the instrument. The data obtained from the trial testing were used to find the internal consistency. The test item of BAT was analyzed and a reliability coefficient of 0.80 was obtained from Kuder-Richardson formula 20 (KR-20). The pretest and posttest data collected from the achievement test were subjected to statistical analyses using mean and standard deviation to answer the research questions, and ANCOVA to test the hypothesis using SPSS version 16.0 window.

Results

Research Question 1

What is the mean achievement score of secondary school biology students exposed to VBI package and those exposed to lecture method?

Table l: Mean and Standard Deviation of Pretest and Post-test Scores of Biology Students Taught VBI Package and those Taught Lecture Method of Teaching

		Pretest		Posttest		
Groups	**N**	**Mean($\bar{x}$)**	**SD**	**Mean($\bar{x}$)**	**SD**	**Mean Gain**
Experimental	86	16.74	2.581	94.10	2.620	77.36
Control	83	15.29	3.122	49.65	6.612	34.36

Table 1 shows the mean and standard deviation of the experimental and control groups at thepretest and posttest. The table revealed that the students in the experimental group taught biologythrough VBI package had mean of 94.10 and a standard deviation of 2.620 atposttest while their counterparts in the control group had mean score of 49.65 and a standarddeviation of 6.612at post-test .This implies that difference exist between the two groups withthe experimental group having higher mean Score.

Null Hypothesis

HO_1: There is no significant difference in the mean achievement scores of secondary school biology students exposed to video based instructional package and those exposed to lecture method.

Table 2: ANCOVA Result for Test of Significant Difference in the Mean Achievement Scores of Secondary School Biology Students Exposed to VBI Package and those Exposed to Lecture Method of Teaching

Source	Sum of Squares	df	Mean Squares	F-Value	P-Value
Corrected Method	101846.000	2	50923.000		145.30.000
Intercept	2793.311	1	2793.311		796.75.000
Pretest (Covariate)	2.082	1	2.082		0.59.442
Treatment	1333.455	1	1333.455		380.35.000
Error	581.976	166	3.506		
Total	930248.000	169			
Corrected Total	102427.979	168			

Significant at ≥ 0.05 probability level

Table shows the ANCOVA result of the achievement scores of students in experimental and control group. The table reveals that significant difference exists between the two groups($F(1,166 = 380.35, p \leq 0.05$). This implies that there is significant difference between theachievement of secondary school biology students taught using video based instructional package andthose taught biology through lecture method.

Research Question 2

What is the mean achievement score of male and female Biology students' exposed to videoinstructional package?

Table 3: Mean and Standard Deviation of Pretest and Posttest Scores of Male and Female Biology Students Taught Using VBI Package.

			Pretest		Posttest		
Groups	**Gender**	**N**	**Mean($\bar{x}$)**	**SD**	**Mean($\bar{x}$)**	**SD**	**Mean Gain**
Experimental	Male	41	17.02	2.547	94.37	2.53	77.35
	Female	45	16.50	2.614	93.87	2.71	77.37

Table 3 shows the mean and standard deviation of the experimental group at the pretest and posttest of male and female students. The table revealed that the male students in theexperimental group taught biology through VBI package had mean of 94.37 and astandard deviation of 2.53 at posttest while the female students had mean score of 95.87 and a standard deviation of 2.71 at post-test. This implies that differences exist between the male andfemale students with the male having higher mean score.

HO_2: There is no significant difference in the mean achievement scores of male and femaleBiology students exposed to video based instructional package.

Table 4: ANCOVA Result for Test of Significant Difference in the MeanAchievement Scores of Male and Female Secondary School Biology Students Taught Using VBI Package

Source	Type III Sum of Squares	df	Mean Squares	F-Value	P-Value
Corrected Method	5.361	2	2.681	.384	.682
Intercept	17267.933	1	17267.933	2.477	.000
Pretest	0.015	1	0.015	0.002	.963
Gender	5.342	1	5.342	0.766	.384
Error	578.697	83	6.972		
Total	762173.000	86			
Corrected Total	584.058	85			

Significant at 0.05 alpha level

Table 4 shows the ANCOVA result of the achievement scores of male and female students in experimental group. The table reveals that there is no significant difference between the male and female students ($F(.384) = 0.766, p \leqq 0.05$). This implies that, there is no significant difference between the achievement of male and female secondary school biology students.

Procedure for the Development of Learning Package: The VBI package was the instrument used in teaching the experimental group, it was developed by the researchers and a programmer. The idea of the researchers to make the instructional package is based on the fact that; (i) the commercially produced package might not have passed through evaluation using biology curriculum,(ii) when they are available, they may not be having relevant objectives

needed to be achieved by the researcher, (iii) the language used by the programmer was evaluated to make sure that it is simple and easily understandable to the students at their level. As a result of this, developing instructional packages for use by the researcher becomes inevitably necessary. The instructional package consists of the same topics and was burnt in a Compact Disk ROM and presented to the client computer with input device on the computers, whereby the learners respond to the computer promptly. The video presents information and display the topics with some explanations to the learners on each of the concepts, after which the students attempted some multiple choice objective questions. Each of the topics was presented by the video on interactive instructional mode, that is, exposure to information, facts and practice on thetopic and immediate response or feedback to the question applicable. It was validated by lecturers in the Department of Science Education, Biological option, Federal University of Technology, Minna as well as logy teachers of secondary school in Suleja Local Government Area of Niger State. All the observation pointed out by the validators were effected before the commencement of the experiment.

Discussion of Findings

The results shows that there is a significant difference between the mean achievement scores of students taught using Video Based Instructional packages (VBI) and lecture method in favour of students taught using VBI. The result is in agreement with the findings of Kareem, (2003) and Jegede, Okebukola and Ajewole (1992) which reported that there is a significant difference in the mean achievement scores of students taught using VBI than those taught using lecture method.

In another study, Gambari and Gana, (2008) found out that Video Based Instructional (VBI) package is that aspect of multimedia that the student will be solely participating in the learning. Video package can be defined as an instructional media which gives the learner the privilege to participate, control and, study at a close pace until the learning is achieved. It also makes the teaching of difficult part of most topics easier for the teacher. Instructional video based package, when used as a teaching material in the sciences makes the practical side to be easy since students are conversant with topic to be practicalized as they participate and control the videos they watch.

It can also be used to bring home the practical topics of biological science on the close observational aspect, making the teaching and learning of Biology to be more of student-centered. The VBI based package can enhance effective teaching and learning process as it helps to improve the teacher (instructor) and the student (learner) in the area of visual and listening. Interactive instructional package is an electronic based technology generally used as teaching material and it comprises of video being manipulated or controlled by the learner at his/her pace for effective learning.

Therefore, it is an instruction that includes drill and practice, tutorials, simulations, instructional management and exercises which leads the students to high level of achievement. The result also revealed that there was no significant difference in the mean achievement score of male and female students exposed to VBI. The result is in agreement with the findings of Adeniye, (2005) while Olaofe, (2005) revealed otherwise.

Conclusion

The outcome of this investigation provides practical proof that the usage of video instructional package enhances students' achievement in mammalian skeleton, osmosis and diffusion in Biology more than the use of lecture method. Secondly, the video instructional package is gender friendly as the hypothesis was accepted. Generally, the use of video instructional package has proved to be viable in stimulating and enhancing effective teaching and learning of mammalian skeleton, osmosis and diffusion.

Recommendations

The following references were made based on the findings of this investigation.

1. Since the application of video instructional package enhances achievement in mammalians keleton, osmosis and diffusion in Biology lesson, the Biology teachers should adopt it as one among various approaches to be engaged in classroom.
2. The VBI package enhances achievement in mammalian skeleton, osmosis and diffusion in Biology lesson of both male and female students. Therefore, Biology teachers should adopt it and apply in classroom.

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