Socialscientia Journal of the Social Sciences and Humanities

Effects of Digital Video Instructional Strategy on Students' Achievement and Retention in Basic Science

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Abstract

The study investigates the Effect of Digital Video Instructional Strategy on Students' Achievement and Retention in Basic Science. Two research questions and two hypotheses guided the study. Quasi-experimental non-equivalent control design was adopted for the study. The study was carried out in Awka Education Zone of Anambra State. The population for the study was 2,694 JS II students from 15 government-owned co-educational secondary schools in Awka Education zone of Anambra State. The sample size for the study was 92 (39 males and 53 females) JSII students selected through balloting sampling. A 40 item multiple choice question of BSAT was the instrument used to collect data. A digital video instructional package was developed for the experimental group. Mean and standard deviation were used to answer the research questions and ANCOVA was used to test the null hypotheses at 0.05 level of significance. The findings revealed that students taught using Digital Video Instructional Strategy (DVIS) achieved and retained more than those taught with lecture method. Based on the findings, it was recommended among others that the use of DVIS should be embraced by teachers to convey their instruction in classroom since it has been found to be effective in basic science students' achievement and retention.

Keywords: Achievement, basic science, digital video instructional strategy, retention

Introduction

Basic Science was known as integrated science until the reform agendain Nigeria education tion brought a change both in content and name, the content became broad and the n ame changed from Integrated Science to Basic Science. Basic science is the first form of s cience a child comes across at the secondary school level; it is an introductory course to th e study of the sciences in the senior secondary school. It is first taught generally as a singl e subject then split into specialized science subjects (biology, physics and chemistry) in th e senior secondary level.

UNESCO in Omiko (2016) defined Basic Science as a Science in which concepts an d principles are presented, so as to express the fundamental unit of scientific thought and avoid premature or undue stress, on the distinction between various scientific fiel ds. Omiko (2016) defined Basic Science as a Science in undifferentiated form which stres ses the fundamental unity of science. Basic Science is a single Science subject in Junior Sec ondary School that involves the study of elementary biology, earth/solar system, ecology, genetics, chemistry and physics.

The aims of Basic Scienceaccording to the National Policy on Education (FRN, 2013) sh

ould be directed at enabling students who are exposed in it, to acquire the following skills: Observe carefully and thoroughly, report completely and accurately what has been observed, organize information acquired, generalize on the basis of the acquired information, predicting as a result of the generalization, designing experiments (including control where necessary) to check predictions, using models to explain phenomena where appropriate, continuing the process of inquiry when new data do not conform to prediction. To achieve these objectives, it is suggested that the teaching and learning of Basic Science should involve the use of innovative strategies and methods of teaching. Omebe and Omiko (2015) observed that a lot of methods of teaching Basic Science have been used for several years by the Integrated Science teachers and yet the results of the students in the Basic Education Certificate Examination (BECE) have not been encouraging. Presently, the current statistics on the students' academic achievement in the Basic Education Certificate Examination (BECE) in Anambra State shows that the teaching and learning of Basic Science is still inadequate. In order to improve on the teaching and learning of Basic Science the researcher is of the view that the use of digital video to teach Basic science may bring about a better performance by students in view of the fact that a number of researches done on digital videos instruction in some other disciplines (Orisabiyi, 2007; Osokoya, 2007) showed significant improvement in the achievement scores of students.

Digital Video Instruction is an instruction that is presented by using a television; monitor and a Digital Video Disc (DVD). Digital Video Disc or Digital Versatile Disc is a type of optical disc that is used for data storage and as a platform for multimedia. The main uses of a Digital Video Disc are video and data storage. The digital video disc has a player which it uses to retrieve what has been stored into it. Digital Video is an audiovisual media which is an instructional media that appeals to the senses of hearing and sight. Some of the audiovisual media has values of illustrating and clarifying non-verbal symbols and images, they can promote greater acquisition and longer retention of factual knowledge.

Digital Video as a change instrument in the classroom has undertaken a unique cycle of adoption over time although not in Nigeria though. Video based materials boost student's creativity and cooperation, access to video can help motivate students and create a distinctive context for their learning experience. (Greenberg, Barnett, and Nicholls 2012) Teaching and learning of basic science have witnessed poor achievement by secondary school students as predicated on Basic Education Candidate Examination (BECE) report between 2014 – 2017 which indicated a discouraging achievement of students in the subject. It showed that the percentage of students who passed at credit level and above was less than 50%. Achor & Agbidye (2014) reported that skeletal system and states of matter are some concept in basic science students perceived difficult to learn.

Purpose of the Study

The main purpose of this study is to determine The Effect of Digital Video Instructional Strategy on Students' Achievement and Retention in Basic Science. Specifically the study sought to find out: (a)   The difference in mean, pretest and posttest scores students' taught basic science using   digital video instructional strategy and students taught with conventional method (b) The difference in mean retention scores students' taught basic science using digital video instructional strategy and students' taught with conventional method

Research Questions

This study will be guided by the following questions: (a) What is the difference in the mean, pretest and posttest scores of students taught Basic Science with digital video instruction and those taught without digital video instruction? (b)What is the difference in the mean, pretest and posttest retention scores of students taught Basic science with digital video instruction and those taught without digital video instruction?

Hypothesis

Ho1. There will be no significant difference in the mean achievement scores of students taught Basic Science with digital video instructional strategy and those taught without digital video instruction.

Ho2. There will be no significant difference in the mean retention scores of students' taught Basic Science with digital video instructional strategy and those without digital video instruction.

Method

Quasi-experimental design was used for this study, specifically, the non-equivalent control group design. The population is total of 2,694 JS II students in all the state government owned co-educational secondary schools in Awka Education zone of Anambra State. The sample was made of 92 (39 males and 53 females) JSII students selected through multistage sampling. A 40 item multiple choice question of BSAT was the instrument used to collect data. Prior to the classroom exercise, teachers who acted as research assistants had been adequately briefed. The pretest was administered to both experimental and control groups before treatment commenced. The experimental group was taught using DVIS developed by the researcher with the help of programmers while the control was taught using lecture method in line with lesson plan prepared by the researcher. Posttest were administered to both groups after treatment, the same instrument was reshuffled and given to the both groups 2weeks later as retention test. In analysis of data mean and standard deviation were used. ANCOVA was used to test the hypotheses.

Results

Table 1: MEAN ACHIEVEMENT AND STANDARD DEVIATION SCORES OF STUDENTS TAUGHT BASIC SCIENCE WITH DIGITAL VIDEO INSTRUCTIONAL STRATEGY AND THOSE TAUGHT USING LECTURE METHOD

Teaching Methods	Pre-test			Post-test			Mean Difference
	N	Mean	SD	N	Mean	SD	
Digital Video Instruction	42	22.24	6.45	42	74.05	10.76	51.81
Lecture Method	50	21.16	5.40	50	35.35	7.41	14.19

The result displayed in Table 1 shows that the pretest mean achievement scores for students taught Basic Science with Digital Video and those taught with lecture method were 22.24 and 21.16 respectively while the posttest mean scores were 74.05 and 35.35. The mean difference for the students taught with digital video instructional strategy was 51.81, and 14.19 for students taught with lecture method. The mean difference shows that students taught Basic Science with digital video instructional strategy had more improvement in mean achievement scores than those taught with lecture method.

Table 2: MEAN RETENTION AND STANDARD DEVIATION SCORES OF STUDENTS TAUGHT BASIC SCIENCE WITH DIGITAL VIDEO INSTRUCTIONAL STRATEGY AND THOSE TAUGHT USING LECTURE METHOD

Teaching Methods	Pre-test			Retention			Mean Difference
	N	Mean	SD	N	Mean	SD	
Digital Video Instruction	42	22.24	6.45	42	71.01	11.79	48.77
Lecture Method	50	21.16	5.40	50	19.39	5.97	-1.77

Table 2 shows that the posttest mean retention scores was 71.01 for those taught Basic Science with digital video instructional strategy and 19.39 for students taught with lecture method. The mean difference for the two groups was 48.77 and -1.77 respectively. While the digital group had 48.77 gain in retention, those taught with lecture had mean loss of 1.77. This suggests that digital video instructional strategy improved students' retention than lecture method. There will be no significant difference in the mean achievement scores of students taught Basic Science with digital video instructional strategy and those taught with lecture method.

Hypothesis 1
There will be no significant difference in the mean achievement scores of students taught Basic Science with digital video instructional strategy and those taught with lecture method.

Table 3: SUMMARY OF ANALYSIS OF COVARIANCE OF STUDENTS' MEAN ACHIEVEMENT SCORES IN BASIC SCIENCE BY TEACHING METHOD

Source of Variation	SS	df	MS	*F*	*p*-value	Decision
Pretest	1655.58	1	1655.58	25.49	.000	
Teaching Methods	32536.58	1	32536.58	500.87	.000	Significant
Error	5781.44	89	64.96			
Total	300206.25	92				
Corrected Total	41619.23	91				

Analysis of Variance presented in table 4.5 shows that there was a statistically significant difference in mean achievement of students taught Basic Science using digital video instructional strategy and those taught with lecture method, $F(1,89) = 500.87$, $p<0.05$. The null hypothesis which proposed no significant difference between the two groups was therefore rejected.

Hypothesis 2

There will be no significant difference in the mean retention scores of students' taught Basic Science with digital video instructional strategy and those with lecture method.

Table 4: SUMMARY OF ANALYSIS OF COVARIANCE OF STUDENTS' MEAN RETENTION SCORES IN BASIC SCIENCE BY TEACHING METHOD

Source of Variation	SS	Df	MS	F	*p*-value	Decision
Pre_test	343.60	1	343.60	4.30	.041	
Teaching Methods	59485.62	1	59485.62	745.27	.000	Significant
Error	7103.79	89	79.82			
Total	238039.00	92				

The result presented in Table 4.6 shows that there was a statistically significant difference in mean retention scores of students taught Basic Science using digital video

instructional strategy and those taught with lecture method, $F(1,89) = 745.27$, $p<0.05$. Therefore, the null hypothesis was rejected.

Discussion
The result revealed that the mean gain of the experimental group is 51.81 and their SD in the pretest and posttest is 6.45 and 10.76 respectively. The control group had a mean gain of 14.19 with SD of 5.40 and 7.41 in their pretest and posttest respectively. Hence, the difference between the mean achievement score of students taught basic science with DVIS and those taught with lecture method is 37.62. The finding of this study reveals that the use of DVIS had a significant effect on students' achievement in basic science. The students taught using DVIS achieved significantly better than those taught with lecture method. This finding is in agreement with the findings of Osokoya, (2007), investigated the effect of video instruction on secondary school students' achievement in History where he found digital video to be effective in the learning of history.

The finding disagrees with the findings of Sani (2011) who found out that digital video for instruction had no significant effect on student achievement in chemistry.The students taught using DVIS achieved significantly better than those taught with lecture method.

The result also revealed that the mean gain of the experimental group is 48.77 and their SD in the pretest and posttest is 6.45 and 11.79 respectively. The control group had a mean loss of 1.77 with SD of 5.40 and 5.97 in their pretest and posttest respectively. Hence, the difference between the mean retention score of students taught basic science with DVIS and those taught with lecture method is 50.54. The finding of this study reveals that the use of DVIS had a significant effect on students' retention in basic science. The students taught using DVIS achieved significantly better than those taught with lecture method. This finding is in agreement with the findings of Adeosun & Ayodele (2008) who examined the relative effects of demonstration and videotape mediated instructional strategies in Yoruba language and found out there is a significant effect of videotape mediated instructional strategies and demonstration on retention. This may be due to the strength of the interaction between the exposures to video and demonstration at the same time.

Analysis of Variance shows that there was a statistical significant difference in mean achievement of students taught Basic Science using DVIS and those taught with lecture method, $F(1,89) = 500.87$, $p<0.05$. The null hypothesis of hypothesis one which proposed no significant difference between the two groups was therefore rejected. Also the null hypothesis of hypothesis two was also rejected as the result shows that there was a statistical significant difference in mean retention scores of students taught Basic Science using digital video instructional strategy and those taught with lecture method, $F(1,89) = 745.27$, $p<0.05$.

Conclusion and Recommendations
From the findings of this study, it is evident that DVIS had significant effect on students' achievement and retention in basic science. (a) The use of DVIS should be embraced by teachers to convey their instruction in classroom since it has been found to be effective in basic science students' achievement and retention. (b) Curriculum planners should revisit and redesign the curriculum to incorporate the use of Digital Video Instructional packages in the delivery of instruction. (c) Workshops, seminars, in-service training, symposia

should periodically be organized by the ministry of education/professional association for practicing teachers. This will provide the teachers with practical and functional knowledge on media utilization in delivering instruction.

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