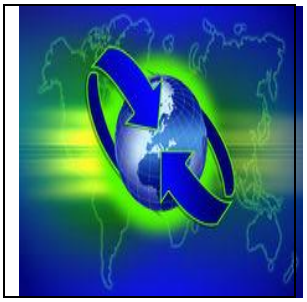

Effects of Audio-Visual Instructional Materials on Teaching Science Concepts in Secondary Schools in Bwari Area Council Abuja, Nigeria

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Received March,2020, Accepted July, 2020, published September, 2020

Abstract

This research work investigated the effects of audio-visual instructional materials on teaching science concepts in secondary schools in Bwari Area Council, Abuja, Nigeria. The study adopted a pre-test, post-test quasi-experimental design. Two research questions and two hypotheses were formulated to guide the study. The sample of the study comprised one hundred students. A Science Achievement Test (SAT) that is, test instrument was used to gather data while mean, standard deviation and t-test statistics were used to analyzed the data. Major finding revealed among others that audio-visual instructional material has a significant effect on students' achievement in sciences, also the use of audio-visual instructional material enhanced the effectiveness among male and female students learning science without gender disparity. Therefore, it was recommended among others that teachers should incorporate the use of appropriate audio-visual instructional materials when teaching their students and they should be encouraged to use audio-visual aids in order to enhance the interest of male and female students and keep them attentive in the class.

Keywords: Audio-visual, science concepts.

Introduction

Today education calls for innovation in teaching that can attract and call the attention of the younger ones to learning. They are virtual generation who want to see, feel and touch what they have been taught and the. The power of audio visual instructional material lies in the fact that it is multi-faceted, for the fact that it stimulates and appeals to senses of the learners. Audio-visual instructional materials in teaching are those image and sound in addition to textual information.

Audio visual instructional material add life to learning experiences, as images and animations make words easier to comprehend and remember. It is of importance to note that the basic aim of education must be to lead students towards self-learning and life-long learning and this aim can be achieved through the use of audio-visual instructional material as it improves the learning capacities of individual students i.e. learning experience that is worth memorable (Singh, Sharma, Upadhya, 2012). Science is an indispensable component of human life activity, therefore, its absence could make life incomplete and ill-equip for the students to live effectively in our modern age of science and technology.

Despite the potential benefits and the increased focus on science education, implementation of new instructional strategy faces several challenges. Often, poor performance is blamed on students because of their low performance; other factors such as teachers also play a significant role during the teaching and learning process as they influence students' academic performance towards the study of science, (Ashish, 2013).Thus, more interactive and engaging environments where enthusiastic teachers facilitate and do not bear too much on students' constructive activities could enable students to feel free, while they take responsibilities for their actions, and learn to construct their own informed knowledge . Presently, teachers, researchers and students have realized the value of audio/visual resources, not as a separate instructional resource, or a teaching gadget, but as an effective, vital instructional medium, providing for the presentation of knowledge through seeing and learning experience.

Nwike & Anene (2013) supported this statement with their findings that reviewed that there is significant effect of treatment with (audio visual aids) on students' achievement in sciences. Jonah, (2013) supported this view, she reported that there is statistically significant difference in the academic performance of students when they are taught with audio visual aids than those taught without them. This finding was also supported by Dale in Carton, (2015) that each instructional material provides different learning experiences and that one instructional

material may provide more learning experiences than another instructional material, for example real audio-victuals provide more learning experiences as students can see and touch.

Students are not that attentive, motivated and interested in classroom situation when they are compelled to that classroom session that is in function without the use of audio-visual (Sampath, Pannneerselvam & Santhan, 2013). Conceptualizing is clearer and concrete as the use of audio-visual appeals, activates and utilizes the five senses of individual student i.e. see, hear and touch. According to Anzaku, (2011) the term audio-visual resource is commonly used to refer to those instructional materials that may be used to convey meaning without complete dependence upon verbal symbols or language. Audio-visuals are tool used to facilitate the learning experience of the individual and to make it more realistic and dynamic (Kinder, 2012).

In teaching and learning of sciences, the use of audio-visual resources proves to be better instructional aids and according to Mgbodile (2009) it yields good result in all domains of learning, that is: the cognitive, effective and psychomotor domains respectively. Presently, there is a shift from teacher-dominated method to child-centered method as learning today becomes more of the learner' duty and the facilitator just needs to instruct, guide and correct. So as to help the learner to develop the spirit of inquiry which is expedient to the learning of science. Visual learning aids can help to play a great role on students' academic performance, as audio-visuals help them to both see and hear the science concepts being taught.

Yusuf (2009) found that audio-visual aids improve male and female students' comprehension in sciences. Thus, the use of audio-visual aids will help to make abstract concepts better understood and enhance academic achievement. This is in line with Jamiu, (2010) who discovered that audio-visual instructional material improves male and female students' academic performance in sciences in senior secondary school. The work of Alio & Ezemaenyi (2010) also agreed with this view, they reported no significant difference in mean scores of male and female students taught with instructional materials. Olatoye & Adekoya (2010) also reported that gender

has no significant effect on students' achievement in some aspects of science when suitable instructional resources are used.

Teachers of science need to be up to date regarding the best practices as obtainable in the developed countries. The resources for effective teaching and learning of science are a necessity to the development of science in Nigeria. Several challenges arise from learning of science in Nigeria. Students are faced with challenges which includes but not limited to; teachers' incompetence in the delivery of the subject matter, outdated laboratories, obsolete textbooks, unavailability of instructional materials, unrealistic methods of teaching, lack of requisite mathematical background for effective calculation and manipulations, attitudinal decay in science as a result of lack of mass and real representation of the subject matter among others (Badmus, Akanmu & Akanbi, 2015).

According to Orji (2011), science education in Nigeria was planned without emphasizing the need for using the right instructional strategies which will be more effective in teaching and learning of the subject. As a result of the identified problem, the attention of many science teachers has continued to be directed towards the search for an alternative and more appropriate method for science instructional resources. Much research effort has been expended on other teaching instructional resources, but audio-visuals still have much to be covered in teaching sciences in Nigeria secondary schools.

The nature of the world in which today's students will live their adult lives cannot be based on prediction, but it is likely to be characterized by an increasingly fast pace of change. We are already experiencing the powerful impact of global interdependence and competition, allied to the transformative effects of sciences on all our lives. Duttley, (2012) had stated that if positive result must be realized in the teaching and learning of science, teachers may have no other choice than to use among other things, audio visuals resources for effective teaching and learning.

This study is motivated by the fact that students do not retain for long or understand what they are taught in sciences. The outcome of which is low academic performance year in and year out in secondary school, this situation has become a source of concern to all stakeholders in the Nigerian Education System, that is, the poor achievement of students in chemistry especially in West African School Certificates Examination (WASCE) and National Examination Council (NECO. One of the major reasons for this dismal achievement could be attributed to the inappropriate ineffective instructional resources being adopted by Nigerian secondary school teachers. It is against this backdrop that the present study was conceived in a bid to ascertain the effect of audio-visual aids in teaching science in secondary schools.

The purpose of the study is to investigate the effect of audio visuals instructional materials in teaching science in secondary schools. Specifically, the objectives of the study are to:

i. To determine the effect of audio-visuals instructional materials in teaching and learning science among secondary school students in Bwari Area Council.
ii. To examine the effect of audio- visual aid among male and female secondary school students learning science in Bwari Area Council.

Research Questions

Two research questions were raised to guide the study:

i. What is the effect of audio-visual aid in learning science among students in experimental and control groups?
ii. What is the effect of audio- visual aids on academic scores of male and female secondary school students learning science?

Hypotheses

The following null hypotheses were formulated for the study.

H_{O1}: There is no significant difference in the mean academic scores of students taught with the use of audio-visual aid in learning science and those taught with conventional method.

H_{O2}: There is no significant difference in the effect of audio- visual aids on academic scores of male and female secondary school students learning science.

Methodology

The research design for this study was quasi-experimental in nature, using pre-test and post-test approach. The sample was drawn from a population of six hundred and thirty-four (634) SSII science students, this class of students are already familiar with sciences and are not busy preparing for external examination. They were randomly selected using simple random technique and were assigned into control and experimental groups respectively, these two schools are equal in term of using the same government approved curriculum, they are also both gender and have qualified science teachers. There were 50 students in experimental group and 50 students in control group.

The instrument used for data collection in this study was Science Achievement Test (SAT) which is a test instrument in the classroom. SAT test items were drawn from past WAEC objectives questions of years 2016 & 2018. The SAT was made up of twenty multiple-choice questions covering the scope for the study. The test items with the marking scheme were revalidated by two secondary teachers and two other lecturers in Department of Science and Environmental Education, University of Abuja. A reliability co-efficient of 0.80 was found using the Kr-21 formula.

Lesson notes were prepared differently for both the experimental and control groups to teach the selected Science concepts. Students in the experimental group were taught Science concepts by the researchers using audio visual instructional material. The control group was also taught using the conventional method. The teaching was carried out for ten weeks while the post-test was administered at the end of the teaching and it lasted for forty minutes.

Data from the study were subjected to appropriate statistical analysis to be able to draw up inferences from it. The t-test, mean and standard deviation were used.

Results

Research Question One

What is the effect of audio-visual aid in learning science among students in experimental and control groups?

Table 1: Difference in Mean Academic Achievement Scores between Experimental and Control Groups

Variable	N	Mean	SD	Mean Difference
Experimental Group	50	25.46	2.45	
				5.05
Control Group	50	20.41	2.32	

Table 1 shows that the mean achievement scores of experimental group and control group as 25.46 and 20.41 respectively. The difference of 5.05 indicates that the audio-visual aids boosted the academic achievement of the students in the experimental group.

H_{O1}: There is no significant difference in the mean academic scores of students taught with of audio-visual aid in learning science and those taught with conventional method.

Table 2: Two-Tailed t-Test Result in Respect of Experimental and Control Groups

Variable	N	Mean	SD	df	t-Value	Std. Error	Sig.	Decision
Experimental Group	50	25.46	2.45					
				98	3.02	1.0014	0.3115	Not Accepted
Control Group	50	20.41	2.32					

Table 2 shows that there is significant difference in the mean academic scores of students taught with of audio-visual aid in learning science and those taught with conventional method t (3.02, df 98, P <0.05) with mean difference of 5.05. Hypothesis is therefore not accepted.

Research Question Two

What is the effect of audio- visual aid among male and female secondary school students learning science?

Table 3: Difference in Mean Academic Achievement Scores between male and female Students in Experimental Group

Variable	N	Mean	SD	Mean Difference
Male	25	35.06	2.42	
				0.3
Female	25	34.76	2.30	

Table 3: shows the mean academic scores of male and female groups as 35.06 and 33.56 respectively. Though the difference is 0.3 in favour of male group, it is very minimal. This means that the performance of male and female groups were insignificant.

H_{O2}: There is no significant difference in the effect of audio- visual aids on academic scores of male and female secondary school students learning science.

Table 4: Two-Tailed t-Test Result in Respect of Male and Female Students in Experimental

Variable	N	Mean	SD	df	t-Value	Std. Error	Sig.	Decision
Male	25	35.06	2.42					
				46	0.42	1.0011	0.000	Accepted
Female	25	34.76	2.30					

Table 4 shows that there is no significant difference in the mean academic scores of male and female students taught with the use of audio-visual aid in learning science with t (0.42, df 46, P <0.05). This implies that the male and female groups taught sciences concepts using audio visual aids performance comparably.

Discussion of findings

The findings of this study seem to support that of Nwike & Anene, (2013) who found out that there is significant effect of treatment with audio visual instructional material on students' achievement in sciences. Also Jonan (2013) supported this view, she reported that there is statistical significant difference in the academic performance of students when they are taught with audio visual instructional material than those taught without them. This finding was also supported by Dale in Carton, (2015) that instructional material provides different learning experiences and that one instructional material may provide more learning experiences than another instructional material, for example real audio-victuals provide more learning experiences as students can see and touch.

The findings of this study also revealed that gender is not a significant factor in students' academic score in science. The study found that effect of instructional material on gender was consistent across gender and the significant increase in academic score of both male and female students in experimental group could be because audio visual instructional material is not gender biased. The result agrees with that of Alio & Ezemaenyi (2010) that there is no significant difference in mean scores of male and female students taught with instructional materials. Olatoye & Adekoya (2010) also reported that gender has no significant effect on students' achievement in some aspects of science when suitable instructional resources are used.

This study also agrees with findings of Gambari & Zubairu (2010); Achebe (2010) and Moreno and Mayer (2000), who found that students taught with multimedia acquired better knowledge, and improved comprehension skills than other groups. This finding is also in line

with Edgar Dale's cone of experiences (in Carton, 2015). Dale introduced the cone of experiences as a "pictorial device" for showing the progression of learning experiences from direct first hand participation to pictorial representation and on to purely abstract, symbolic expression. He arranged the learning experiences from the point of view of learners in order of increasing abstractness or decreasing concreteness. The cone indicates that real direct experience have least abstractness and maximum concreteness, followed by contrived experiences which are not very rich, concrete and direct as real life direct experience. The series followed down to verbal symbols which has the least concreteness and maximum abstractness.

The result in table 4 designated that there is no significant difference in the mean academic scores of male and female students taught with of audio-visual aid in learning science with t(0.42, df 46, P <0.05). This implies that the male and female groups taught sciences concepts using audio visual aids performance comparably. This is in line with Jamiu, (2010) who discovered that audio-visual instructional material improves male and female students' academic performance in sciences in senior secondary school. Also, Yusuf (2009) found that audio-visual aids improve male and female students' comprehension in sciences. Thus, the use audio-visual aids will help to make abstract concepts better understood and enhance academic achievement.

Conclusion

This study has confirmed that science students taught with audio visual instructional material attained higher significant academic score that their counterparts taught with the conventional method. Therefore, the use of audio visual instructional material enhanced students' academic score than conventional method. By implication the study discovered that audio visual instructional material can improve academic score of students in science. The study also discovered that audio visual instructional material was not gender biased as it enhanced academic

score of both male and female science students. This revealed by implication that audio visual instructional material may then to encourage both gender in the study of science.

Recommendations

i. Science teachers should be encouraged to use audio visual instructional material as one of the instructional strategies rather than using conventional method to enhance students' comprehension in Science subjects.

ii. Curriculum planners and stakeholders in education should reach a point to include audio visual instructional materials in teaching and learning in our secondary schools.

iii. Governments at all levels should provide easy access for science teachers to attend in-service and pre-service training, seminar, workshops and conferences where they can learn and develop the use of audio-visual instructional materials.

iv. Also, adequate provision for audio- visual instructional materials such as: projectors, computer, screen, power supply/generators and human personnel should be provided for in our various secondary schools.

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