Paper 6

Assessment of the Use of Projected-Media for Learning Basic Science and Technology in Upper-Basic Schools in Ilorin, Nigeria

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Abstract

Projected-Media are those materials that are projected (enlarged) for better visualization of the class during teaching and multimedia projectors are those gadgets that are used for projecting the materials or media. Due to the importance of projected media in learning, this study was designed to assess the impact of the use of projected media in learning of Basic Science and Technology in Upper Basic Schools in Ilorin, Kwara State, Nigeria. The study was a quasi-experimental research design of the pre-test, post-test and non-randomized control group design. One hundred and eighteen (118) students were sampled to constitute the experimental group while forty one (41) students were sampled for the control group. An achievement test named "Basic Science and Technology Achievement Test (BSTAT)" with a reliability index of 0.87 was used as research instrument. Data were analysed using t-Test and Analysis of Variance (ANOVA) at .05 level of significance. Findings revealed among others that there was significant difference in the learning outcome of pupils taught Basic Science and Technology with projected media and those taught without the use of projected media in favour of those taught with projected media. It was therefore recommended that teachers should use projected media for teaching Basic Science and Technology in their schools.

Keywords: Projected – media, Learning, Assessment, Upper Basic Schools and Basic Science and Technology.

Introduction

Science and technology are two inseparable words that are needed to solve any community concerns. Science can be defined as a systematic body of knowledge obtained by methods or techniques based on observation and experimentation (Adebayo & Shogunle (2020)). According to these authors, science and technology have always been recognized as a critical factor in the process of development.

Basic Science and Technology (BST) is taken as a single subject comprising of four subjects in the new 9-Year Basic Education Curriculum. These four subjects are:

- Basic Science
- Basic Technology
- Physical and Health Education (PHE)
- Information Technology (IT)or Computer Studies

According to the National Education Research and Development Council (NERDC), the objectives of the subjects are:

i. help children develop interest in science and technology
ii. help school children acquire the basic knowledge in science and technology
iii. help Nigerian school children develop creative problem solving ability
iv. help Nigerian children appreciate the beauty of nature and learn how to preserve and improve their environment
v. help children apply their scientific and technological knowledge and skill to solve societal problems
vi. help prepare Nigerian school children for further studies in science and technology

Basic-Science-Technology teachers must understand that this is a practical subject. Hence, the success of its delivery stretches beyond the cognitive objectives. A BST teacher is a demonstrator, mind influencer and a motivator that inspires his/her student to do. As a result, s/he delivers the class by demonstration and motivation while measuring his/her performance by what the pupils are able to do at the end of the lesson (Shieh, 2012; Serin, 2011).

In using instructional materials to solve some of these problems in education, teachers should be systematic in designing, carrying out and evaluating the total process of teaching and learning in terms of specific objectives to be achieved, which are based upon research in human learning and communication, to bring about more effective instruction in the learning process (Abdu 2015).

Instructional materials are teaching aids that are applicable in promoting and enhancing the process of teaching and learning (Yusuf, 2020b). The use of technology has played a vital role in enhancing the teaching and learning processes in education. Information and communication technology can provide solutions to many of the challenges of science education, and will help enhance the quality compared to traditional classroom teaching (Ojha, 2016).

Ojha (2016) affirms that the traditional chalk and talk method could not help out to solve the problem of learners and hence the need for considering the use of ICT as an alternative. Abdu (2015) affirmed that the creative use of a variety of media will increase the probability of students learning by helping them to retain what they learn, and improve their performance in the skills they are expected to develop. Projected media generally have been found to aid the teacher and the learner by providing visual and audio information (Raiser & Gagre, (1983); Amin, Azim & Kalan (2018).

With the help of projected media, there is possibilities of covering many topics in BST that are required and necessary in a stipulated time frame since major items with the description will be display on the screen and this can enhance better understanding in a very short time. According to Yaroshenko, Samborska and Kiv (2022), audiovisual media technologies can be implemented by educators on all educational levels and disciplines, either as tools they use themselves to convey knowledge through stimulating the senses as a vivid teaching environment is created, or as tools for the learners to use which can correlate concepts with skills to reach more effective outcomes through creativity.

Projected media can be classified into projected still / motionless media (slide, overhead multimedia projector, in focus, etc) and projected motion media (film, television, video, computer, etc) (Chen, Li & Zhang, (2018). Projected media could be audio, visual or audio-visual in nature. Amin, Azim and Kalan (2018) observed that students learn to interact more effectively when learning takes place through the use of projected still visual.

According to Abdu (2015) and Alaba (2001), overhead multimedia projectors are all those devices like, machines and materials which can be used by educators to present a complete body of information in the teaching and learning process for a more effective instruction. The former opined that the availability of instructional projection to teach the students is likely to lead to effective learning outcomes. Virtual environments allow students to observe the process in more detail, compared to talk-and-chalk method of the traditional classroom (Gambari, Kawu, & Falode (2018). Nicolaou, Matsiola & Kalliris (2019) concluded that the right selection of teaching methods utilizing audio-visual media technologies should be adjusted so as to accommodate the differences in learning needs of the distinctive levels and disciplines.

Though many scholars reveal that it is important for teachers when teaching science subjects to use electronic educational resources for teaching as part of information technologies which will help to generate the interest of the learners but major literatures review that usage of projected media were on art and social science subjects, therefore, the goal of this research study was to assess the use of projected media in teaching and learning of Basic Science and Technology in Ilorin, Nigeria.

This study is very significant as its findings would be of immense benefits to the learners, teachers and the society at large. It will also help schools to maximum utilization of audio-visual materials in schools most especially multimedia projectors, effort will be made to reduce hindrances and promote adequate utilization of the available resources. The result of this study will be made available to science teachers in the school system through workshops and seminars so that they can utilize the methods effectively in the classroom.

Research Questions

The following questions were raised to guide the study.

1. What are the mean achievement scores of pupils taught with projected media and those taught without projected media?
2. What is the difference in the learning outcome of male and female pupils taught with projected media?

Research Hypotheses

Two hypotheses were formulated and tested in this study.

HO_1: There is no significant difference in the learning outcome of pupils taught Basic Science and Technology with projected media and those taught without the use of projected media.

HO_2: There is no significant interaction effect of projected instructional media and gender on pupils' achievement in Basic Science and Technology.

Methodology

This study adopted a quasi-experimental research design of the pre-test, post-test and non-randomized control group design. This study employed a 2 X 2 factorial research which represent two grouped instructional strategies (use of projected media and conventional teaching method) and the pupils' gender (male and female). The experimental groups were taught using the projected media through the use of the multimedia projector while students in the control were not taught with any projected media. The function of pre-test is to determine the effectiveness and changes that result from the different teaching approaches. The post-test was used to determine the impact of treatment on the two experimental groups in each school. Pre-test was given before treatment to evaluate the equivalence of the experimental and the control group. The dependent variable was students' performance while the moderating variable was students' gender and the independent variable was the use of the multimedia projector as instructional material.

This study adopted a quasi-experimental research design of the pre-test, post-test and non-randomized control group design. This study employed a 2 X 2 factorial research which represent two grouped instructional strategies and the pupils gender (male and female). The experimental groups were taught with multimedia projector for this research while students in the control group were taught conventionally. The function of pre-test is to calculate the effectiveness and changes that result from the different teaching methods. The post-test was used to determine the impact of treatment and ability level on the two experimental groups in the two schools. Pre-test was given before treatment to evaluate the equivalence of the groups. The dependent variable was the student's performance while the moderating variable was students' gender and the independent variable was the use of projected media using multimedia projector as instructional material.

The population of the study comprised all junior secondary school pupils or upper basic pupils and BST teachers in Ilorin, Kwara State, Nigeria. The target population was only all Junior Secondary School III (JSIII) also referred to as Basic IX pupils with their BST teachers. The selected pupils were from three public schools and one private school in Ilorin. Respondents from each of the four schools were divided into two groups and by simple random sampling technique one group was selected in each school as the experimental group and the second group as the control group.

Basic Science and Technology Achievement Test (BSTAT) was the only instrument used for the study. This consisted a series of questions for the purpose of gathering information from the sampled pupils and it contained two sections; the first section was for the purpose of collecting the demographic data such as the school type, class and gender. The second section of the Basic Science and Technology Achievement Test (BSTAT) contained multi-choice test questions that were developed by the researchers and properly validated by two lecturers in the Department of Science Education, and one from the Department of Educational Technology, University of Ilorin, Ilorin. The reliability index of the instrument was determined to be 0.87 using Cronbach's Alpha statistic. Each question had options A-D out of which one was correct. The instrument was used as pre-test and post-test to ascertain students' prior knowledge before the treatment and after the treatment was administered. The instructional tool which was the treatment that was used for teaching the pupils is the multimedia projector.

The researchers personally handled the teaching and application of instruments (pre-test and post-test to all the groups). Both the experimental and control groups were pre-tested before teaching began to determine their entry knowledge. A total of 160 copies of test items was produced and distributed to the sampled pupils. The instrument was administered with the assistance of their teachers, who were already trained on test item distribution and test administration. After the completion of the test administration, the researcher collected back the instrument for data analysis. The data obtained from this study was subjected to statistical analysis, using descriptive and inferential statistics. Frequency and simple percentage were used to enumerate the total number of respondents. The Mean and Standard deviations of both experimental and control groups was compared to determine whether or not projected media as an instructional material improved the learning of Basic Science and Technology. Hypotheses 1 and 2 were tested using t-test, while hypothesis 3 was tested using Analysis of Variance (ANOVA) at .05 significant level. SPSS version 22 was used for data analysis.

Data Analysis and Results

Table 1 shows the demographic distribution of the respondents. The table shows that in the control group, 20 (48.78%) of the respondents were males while the remaining 21 (51.22%) were females. The table also shows that in the experimental group, 44 (37.29%) of the respondents were males while the remaining 74 (62.71%) were females.

Table 1

Demographic Data of the Respondents

Group	**Gender**	**Frequency (%)**	**Sub-Total (%)**
Experimental group	Male	44 (37.3%)	118 (74.2%)
	Female	74 (62.7%)	
Control group	Male	20 (48.8%)	41 (25.8%)
	Female	21 (51.2%)	
Total			**159 (100.0%)**

Research Question 1: What are the mean achievement scores of pupils taught with projected media and those taught without projected media?

To measure the impact on the academic performance of pupils taught Basic Science and Technology with projected media. Mean and standard deviation were then used to answer this research questions. Items on aspects listed were structured in a four-response-type, 2.50 was used as the benchmark for determining participants' responses. Thus, any item whose mean score is equal and above 2.50 signifies the impact on the academic performance of pupils taught Basic Science and Technology with projected media.

Table 2 depicts the grand mean score of 2.86, which implies there is significant impact on the academic performance of pupils taught Basic Science and Technology with projected media. The implication of this is that projector as an instructional material brings about meaningful learning by drawing the attention of the learners, hence, improves students' performance.

Table 2

Impact of the Use of multimedia projector on the Academic Performance of Students Taught Basic Science and Technology.

S/N	Statement	Mean	SD	Reject
1	Projector as an instruction material makes teaching of Basic Science and Technology easy	2.57	1.12	Positive
2	Projector in teaching Basic Science and Technology draws the attention of the learner.	3.12	0.71	Positive
3	The use of projector improves pupils' performance	2.85	0.91	Positive
4	Projector makes teaching and learning more interesting	3.01	0.79	Positive
5	Using projector in teaching of Basic Science and Technologybrings about meaningful learning	2.76	0.89	Positive
	Grand Mean	**2.86**	**0.88**	**Positive**

Research Question Two: What is the difference in the learning outcome of male and female pupils taught with projected media?

Table 3 shows that the mean achievement score of the experimental group (pupils taught with projected media) in the study is 17.12 (SD = 2.12), which is higher than the mean of the control group (pupils taught with conventional teaching method) of 10.19 (SD = 2.97). This indicates mean difference between the two groups, and in favour of experimental group. To ascertain whether the observed difference is significant, hypothesis one was further tested.

Table 3

Mean Scores of Students Taught with Projected Media and Conventional Teaching Method.

Group	N	Mean	SD
Experiment group	118	17.12	2.12
Control group	41	10.19	2.97

Hypothesis One: There is no significant difference in the learning outcome of pupils taught Basic Science and Technology with projected media and those taught without the use of projected media.

Analysis on Table 4 computed at.05 alpha level presents F-value as 15.177 and p-value as 0.000. Since p-value (0.000) is lesser than alpha level (0.05), the null hypothesis one is therefore rejected and thus, there is statistically significant difference in the learning outcome of pupils taught Basic Science and Technology with projected media and those taught without the use of projected media ($F_{(1.68)} =$ 0.000, $p<0.05$). Experimental group (M =17.12) performed more than the control group (12.19).

Table 4

ANCOVA Summary of Pupils Taught with Projected Media and Conventional Teaching Method.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision
Corrected Model	361.157[a]	1	361.157	15.177	.000	
Intercept	7221.729	1	7221.729	303.488	.000	
Group	361.157	1	361.157	15.177	.000	Rejected
Error	1618.114	68	23.796			

Total	9201.000	70
Corrected Total	1979.271	69

Hypothesis Two: There is no significant interaction effect of projected instructional media and gender on pupils' achievement in Basic Science and Technology.

Analysis in Table 5 computed at 0.05 alpha level presents F-value as 0.152 and p-value as 0.698. Since p-value (0.698) obtained is greater than alpha level (0.05), thus, the hypothesis is not rejected, hence, there is no significant interaction effect of projected instructional media and gender on pupils' achievement in Basic Science and Technology($F_{(1.68)} = 0.698$, $p>0.05$).

Table 5

ANCOVA Showing the Interaction Effects on Gender.

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Decision**
Corrected Model	4.402[a]	1	4.402	.152	.698	
Intercept	7002.917	1	7002.917	241.129	.000	
Gender	4.402	1	4.402	.152	.698	Rejected
Error	1974.869	68	29.042			
Total	9201.000	70				
Corrected Total	1979.271	69				

a. R Squared = .002 (Adjusted R Squared = -.012)

Summary of Findings

Findings obtained from this study were summarized in the following:

1. There was significant difference in the learning outcome of pupils taught Basic Science and Technology with projected media and those taught without the use of projected media ($F_{(1.68)} = 0.000$, $p<0.05$). Experimental group (M =17.12) performed more than the control group (12.19).
2. There was no significant difference in the mean achievement scores of male and female pupils taught Basic Science and Technology with projected media ($F_{(1.68)} = 0.698$, $p>0.05$).

Discussion

Findings from the study revealed there was significant impact on the academic performance of pupils taught Basic Science and Technology with projected media. The implication of this is that projector as an instructional material brings about meaningful learning by drawing the attention of the learners, hence, improves students' performance. This finding is in line with the findings of Njoku (2016) carried out on the effect of the use of audio-visual materials on students' achievement in computer in junior secondary schools in Ebonyi state. The author concluded that the use of audio-visual material had a huge effect on the academic achievement of the students.

There was significant difference in the learning outcome of pupils taught Basic Science and Technology with projected media and those taught without the use of projected media. Pupils taught using projected media performed better than those who were not taught with it. It can be inferred that the utilization of projected media is a better way of achieving good performance in BST as it caters for individual needs and differences in learning styles. Similar to this finding is that of Stephen and Isaac (2013) who found that that students taught with projected media performed better than those taught without projected media and also that the use of projected media generally improved students' understanding of concepts and led to high academic achievements. Abdu (2015) also reported great impact of projected media usage on the students' academic performance in Katsina State.

There was no significant difference in the mean achievement scores of male and female pupils taught Basic Science and Technology with projected media. This may be because both male and female pupils were both taught using projected media; hence, the performance as better was to be equivalent. This finding corroborates that of Abdu (2015) who observed that gender has no significant influence of students' academic performance. However, this finding is in contrary to

the finding of Njoku (2016) that observed that the males from the experimental group in his research showed a remarkable measure of understanding more than the females.

Conclusion

The conclusion from this study is that the use of projected media could be used to enhance students' academic performance in Basic Science and Technology. So also, gender has no significant influence on students' academic performance when taught Basic Science and Technology with projected media.

Recommendations

The following recommendations were made based on the findings of this study:

1. BST teachers should adopt the use of projected media in order to enhance students' academic performance in the subject.
2. Schools and educational board should encourage the use of projector in class as it enhances the academic performance of students massively.
3. Regardless of students' gender, students should be given equal consideration as far as the learning with projected media is concerned.
4. Universal Basic Education Commission (government) should provide projected media for the teaching of Basic Science and Technology in basic schools since basic education is the foundation of the system.

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