

# Effect of Projected Instructional Media on Senior Secondary School Students Retention in Biology

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**Abstract:** - This study investigated the effect of projected instructional media on senior secondary school students' retention in biology. Two research questions were raised and two null hypotheses formulated to guide the study. It was conducted in co-educational schools in Benue State educational zone B. Purposive sampling technique was used to select the two schools for the study. The sample of one hundred and sixty-five SSI students was used. Researchers developed instrument (Biology Retention Test) was used to collect data for both pre-test and post-test. Mean and standard deviation were used to answer the research questions while analysis of covariance (ANCOVA) was used to test the hypotheses at 0.05 alpha level. The findings show that students taught with projected instructional media retained higher than those taught without projected instructional media. It was found that the female students also retained higher than their male counterparts when taught using projected instructional media. However, this difference was not significant. The study recommend that biology teachers should be encouraged to adopt the use of projected instructional media in the teaching and learning of photosynthesis and biology in general as this will enhance students' retention and eliminate gender related differences in the classroom.

**Keywords:** Effect, Projected Instructional Media, Retention, Students, Biology.

## I. INTRODUCTION

Attaining and sustaining national development is a great desire among many nations of the world. This could only happen when such nations engage their potentials towards the building of science and technology. Science is a way of thinking in pursuit of understanding nature (it is a way of investigating and a body of established knowledge) Aniodoh (2012). Science therefore is very crucial in shaping the way we think, explore, generate and apply knowledge about our environment. The importance of science in national development can hardly be overemphasized. According to Ivowi (2003), the development of a nation depends largely on the level of scientific and technological literacy possessed by the citizenry.

Biology as an integral part of natural sciences is needed for our nation's technological breakthrough. According to Nsofor (2010), biology covers a wide scope, and serves as a spring board for many future careers in science and technology and has application, nearly in every field of life. For a nation to be considered as a developed society in the technological age, the study of biology is the brain behind its growth; it is important since it forms a veritable armour against

misconception and superstitions which muddles technological advancement anywhere. It is a natural science that deals with the living world; how the world is structured, how it functions and what these functions are, how it develops, how living things came into existence, and how they react to one another and with their environment (Umar, 2011). Biology is a pre-requisite subject for many fields of study that contributes immensely to the technological growth of the Nations (Ahmed, 2008). This includes medicine, pharmacy, nursing, agriculture, forestry, biotechnology, nanotechnology, and many other areas (Ahmed & Abimbola, 2011). As a scientific discipline, it is a fundamental subject in the development of any Nation including Nigeria. Its developed potentials are evident in biomedical sciences, agricultural sciences, textile, paper and dyeing technology, biotechnology, environmental sciences and socio-cultural issues (Tutor Vista, 2010).

Biology is one of the core subjects in Nigerian secondary school curriculum; because of its importance, almost all students enroll for it in the senior secondary school certificate examination (SSCE) (Ahmed, 2008). Biology is introduced to students at senior secondary school level as a preparatory ground for human development, where career abilities are groomed, potentials and talents discovered and energized (Federal Republic of Nigeria, 2009). The quality and quantity of science education received by secondary school students are geared towards developing future scientists, technologists, engineers, and related professionals (Kareem, 2003).

Projected instructional media are those channels of communication which promote the effectiveness of instruction and help the teacher to communicate ideas effectively to his students. Njoku in Akoja and Ali (2012). These media are alternative channels of communication when a Biology teacher can use to concretize a concept during his/her teaching. They include all the substantial resources that an educator might use to implement instruction which facilitate students' achievement and retention of knowledge. They aimed at grasping or stimulating students' attention, sprouting and arousing their interest, supporting their learning with living examples and visual elaboration, which makes classroom learning environment enjoyable (Isola, 2010).

Projected instructional media are those channels, ways or medium by which information, skills; knowledge among others is translated to learners during teaching-learning

process. It is a way of passing information from a facilitator to the learner. They assist in achieving the stated behavioural objectives when evaluation is carried out at the end of the lesson or programmes (it tests knowledge and ability) and help students to retain knowledge for longer periods. (Awolaju, 2015). For instance, Abdu-Raheem (2012). In the study of the influence of gender and Secondary School Students Academic Achievement in South-West, Nigeria, reported that male and female students achieved equally in English Language while males achieved better than females in science.

The effect of gender on the academic achievement of students has in recent time been attracting attention from researchers and psychologists. There is however no consensus among scholars on the effect of gender on students' performance in schools. While some studies such as Adeoye (2000) reveals statistically significant effect of gender on performance in physics, others such as Akinbote (1999) and Rotimi, Ajogbade and Adebola (2012) show no significant difference in the performance of both boys and girls in Social Studies and Chemistry respectively. A critical observation of students' enrolment in geography in both secondary schools and higher institutions of learning reveals the fact that male students are more than their female counterparts, giving an impression that geography is gender sensitive.

Mudasiru (2005) in his study of the effects of videotape and slide instructions on students' performance in Junior Secondary School Social Studies examined the significant difference in the post test and retention test achievement scores of students taught using VT, slide tape and the normal classroom instruction. The sample consisted of 191 Junior Secondary School students drawn from three equivalent secondary schools within Ilorin metropolis. The Social Studies Achievement Test (SSAT) was administered to students as pre-test, post-test and retention test. The results of students were analyzed using analysis of covariance (ANCOVA). Turkey's test was used for post-hoc confirmation of significant deference. The results indicated that the students using VT and those taught using slide-tape performed significantly better than their counterparts taught using the normal classroom instruction. However, there was no significant difference reported in the post-test and retention test scores of students taught using VT and those exposed to slid-tape instructions. These findings indicated that social studies content could be taught and learnt better through the resourceful integration of VT and slide-tape into social studies instruction.

The study has a relationship with the present study in terms of retention, method of data analysis which is Analysis of Covariance (ANCOVA) but differs in terms of subject and location as well as sample size. The previous study had the sample of one hundred and ninety-one junior secondary students while the present study is one hundred and sixty-five senior secondary students, subjects is social studies and

location is Ilorin State while the present research is in biology and Benue State.

#### *Statement of Problem*

Based on the above background, this study examined the effect of gender and on secondary school students' retention in biology using projected instructional media in Educational Zone B of Benue State, Nigeria.

#### *Research Questions*

The following research questions were raised to guide this study:

1. What is the mean difference in retention scores of students taught Biology using projected instructional media and their counterparts taught without projected instructional media?
2. What is the mean difference in retention scores of male and female students taught in Biology using PIM?

#### *Hypotheses*

The following hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant difference in the mean retention scores of student taught biology using PIM and their counterparts taught without PIM.
2. There is no significant difference in the mean retention scores of male and female students taught biology using projected instructional media.

## II. METHODOLOGY

The study adopted the quasi experimental research design. Specifically, the pre-test post-test non-equivalent control group design was used.

The population for the study was 11,520 consisting of male and female senior secondary school I students (SSS I) who offer biology as a subject in the study area of education zone B. A total number of one hundred and sixty-five biology students took part in the study. The simple random sampling technique was used to select two schools from seven local government areas in the zone. The schools chosen were randomly assigned to experimental and control groups (1 school each for experimental and control group) in each of the schools selected, the intact class was used.

The instrument for data collection was a Biology Retention Test (BRT). The instrument was a 40 item multiple choice objective questions with options A – D. Each correct answer attracted two and a half mark while each wrong answer attracted a zero score.

The instrument was validated by three experts, one from Test and Measurement in the Department of Educational Foundations and General Studies and two from the Department of Science Education. The reliability of the instrument was 0.72 using the split-half method of Pearson r.

### Research Procedure

In order to account for initial differences among the groups, pre-test was administered to the two groups; the result obtained were used as covariate in the final analysis. Also, to control the teacher variable, both groups were taught by research assistants who were the Biology teachers in the selected schools. The researcher assistants were properly trained on the use of projected instructional media.

The experimental group was taught the process of photosynthesis using the projected instructional media while the control group was taught without the projected instructional media. After the completion of the teaching, post-test was administered to both group. Two weeks later, the

retention test was administered to both groups. The results of the experiment are shown below.

### III. RESULTS

The results are presented by answering the research questions as well as testing the hypotheses. The statistical tool used was the Analysis of Covariance (ANCOVA) and tested at 0.05 level of significance.

#### Research question I

**What is the mean difference in retention scores of secondary school students taught biology using PIM and those taught Biology without PIM?**

Table 1: Mean Retention Scores and Standard Deviation of Experimental and Control Groups

Groups	N	Pretest mean	SD	Posttest (BRT) Mean	SD	Mean gain
Experimental	87	22.83	14.57	76.72	15.84	53.89
Control	78	25.22	17.95	41.44	16.67	16.22
<b>Mean Difference</b>		<b>-2.39</b>		<b>35.28</b>		<b>37.67</b>
<b>Total</b>	<b>165</b>					

Table 1 shows that in pretest, the experimental group had a mean achievement score of 22.83 with a standard deviation of 14.57, while the control group had a mean retention score of 25.22 with a standard deviation of 17.95. In the retention test (BAT), the experimental group had a mean retention score of 76.72 with a standard deviation of 15.84, while the control group had a mean retention score of 41.44 with a standard deviation of 16.67. A mean difference of 2.39 was observed between both groups in the pretest while a mean

difference of 35.28 was observed between the groups in the posttest. The overall mean difference between the experimental group and control group is 37.67.

#### Research question II

**What is the mean difference in retention scores of male and female secondary school students taught Biology using PIM?**

Table 2: Mean Retention Scores and Standard Deviation of Male and Female Students in Experimental Group

Groups	N	Pretest mean	SD	Posttest (PCRT) mean	SD	Mean gain
Male	47	19.09	12.83	74.79	16.96	55.7
Female	40	27.24	15.39	78.99	14.29	51.75
<b>Mean Difference</b>		<b>-8.15</b>		<b>-4.20</b>		<b>3.95</b>
<b>Total</b>	<b>87</b>					

From Table 2, in pretest, the male students in the experimental group had a mean retention score of 19.09 with a standard deviation of 12.83 while the female students had 27.24 as their mean retention score with a standard deviation of 15.39. Then in the retention test (BRT), the male students in the experimental group had a mean retention score of 74.79 with a standard deviation of 16.96 while the female students had 78.99 as mean retention score with a standard deviation of 17.29. The mean difference between the retention scores of

male and female students in pretest was 8.15 while a mean difference of 4.20 was recorded between the male and female students in the retention test.

#### Research hypothesis I

**There is no significant difference in the mean retention scores of students taught Biology using projected instructional media and those taught without the use of projected instructional media.**

Table 3: Summary of Analysis of Covariance (ANCOVA) Results of Experimental and Control Groups in Retention Test (BRT)

Source of variance	Sum of squares	df	Mean square	F	Sig
Corrected Model	52106.63	4	13026.66	49.55	.00
Intercept	157076.31	1	157076.31	597.41	.00
Pretest	4.512	1	4.512	.017	.89
Group	49082.94	1	49082.94	186.68	.00
Error	42068.43	160	262.928		
<b>Total</b>	<b>689015.36</b>	<b>165</b>			
<b>Corrected Total</b>	<b>94174.06</b>	<b>164</b>			

Table 3 shows that the treatment (projected media) was significant at 0.05 level of significance ( $F = 186.68$ ,  $P = .00$ ;  $P < 0.05$ ). Hence, the null hypothesis was rejected. There was a statistical significant difference in the mean retention scores of students taught Biology using projected instructional media and those taught without the use of projected instructional media.

### **Research hypothesis II**

**There is no significant difference of projected instructional media on the mean retention scores of male and female students' in Biology.**

Table 4: Summary of Analysis of Covariance (ANCOVA) results of Male and Female Students in Experimental Group in Retention Test BRT

Source of variance	Sum of squares	df	Mean square	F	Sig
Corrected Model	52106.63	4	13026.66	49.55	.00
Intercept	157076.31	1	157076.31	597.41	.00
Pretest	4.512	1	4.512	.017	.89
Gender	827.81	1	827.81	3.15	.08
Error	42068.43	160	262.93		
Total	689015.36	165			
<b>Corrected Total</b>	<b>52221.66</b>	<b>164</b>			

The summary of the ANCOVA presented in Table 4 shows that the treatment (Projected media) was not also significant due to gender in the retention test. This is shown by gender value of retention ( $F=3.15$ ,  $P=.08$ ;  $P>0.05$ ). Hence, the null hypothesis was not rejected. This means that there is no significant difference in the mean retention scores of male and female students taught Biology using projected instructional media.

### **IV. DISCUSSION**

The study was designed to find out the effect of projected instructional media on senior secondary school students retention in biology. Gender was also considered as a moderating variable. The findings of this study indicates that students that were taught Biology using projected instructional media retained the Biology concepts learnt better than those that were taught without projected instructional media. This shows that projected instructional media enabled students to retain better what was learnt over a period of time. This means that the projected instructional media used in teaching student's photosynthesis resulted in significant increase in the retention of knowledge. The use of projected instructional

media has certain advantages such as: it can be viewed as many times as needed thereby having an opportunity to improve their retention unlike other classroom instruction.

The finding is in line with the view of Chianson (2011) and Rotimi, Ajogbeje and Adebola (2012), their studies show that students who were subjected to the use of projected instructional media were able to retain the concepts been taught as it removes boredom and abstraction in classroom learning thereby aiding assimilation and retention. The finding however disagreed with earlier findings by Mudasiru (2005), who reported that there was no significant difference in the mean retention scores of students taught using projected instructional media and those taught without projected instructional media. This may probably be as a result of improper implementation of the projected instructional media.

The finding on the other hand reviewed that gender has no significant effect on students' retention in Biology. The result shows that, female students retained knowledge slightly higher than the male students when taught biology concepts using projected instructional media. However, this difference

was not significant. The findings of the study are in line with those of Mudasiru (2005), Ayodele (2009) and Oludipe (2012) who have earlier found no significant difference in mean retention of male and female students in Biology.

#### V. CONCLUSION

Projected instructional media was found more effective than conventional teaching method on students' retention in Biology. Since students that were taught biological concepts using projected instructional media retained better the concepts learnt than those taught without projected instructional media. It is also clear that there was no significant difference in the mean retention scores of male and female students when taught Biology with projected instructional media

#### VI. RECOMMENDATIONS

1. Projected instructional media was found more effective than conventional teaching method on students' retention in biology. Hence Biology teachers should be encouraged to employ the use of projected instructional media in teaching Biology.
2. Efforts should be made to equip serving biology teachers with requisite knowledge, skills and competencies on the production and use of projected instructional media. This can be done through organizing seminars, workshops, conferences.
3. Projected instructional media and their uses should be incorporated into the senior secondary school biology curriculum. This will enable the teachers to apply them appropriately to teach biology.
4. Teacher education programmes in colleges of education and Universities should be made to inculcate in the students the processes of production and use of projected instructional media in teaching biology.

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