

**Efficacy of Activity Base Learning/Instructional Material on Academic Performance,  
and Retention among SSII Biology Students in Sabon-Gari  
Local Government Area, Kaduna State Nigeria.**

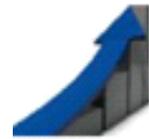
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**Abstract**

*This study investigated the Effect of Activity-based learning/Instructional Material on Academic Performance, Attitude and Retention among SS II Biology Student in Sabon-Gari Local Government Area of Kaduna State, Nigeria. The target population for the study were all the SSII students in Sabon-gari Local Government Area of Kaduna state comprising a total number of 1780 of students. Two co-educational schools with a total number of 120 students were selected and intact class of the chosen schools was used. The design adapted was quasi- experimental technique involving two groups i.e the experimental and control group. Two instruments were developed for the study i.e. Biology Performance Test (BPT) and Student's Attitude Lesson Plans (SAPL). Two research questions and two null hypotheses were formulated and tested at 0.05 level of significance. The data collected were analyzed using mean, standard deviation and t-test. The Findings of the study reveals that those students taught biology using activity-based learning/instructional materials performed better than those taught the same concept in biology using lecture method. The researcher recommended among others, that biology teachers should be encouraged to use activities-based learning/instructional materials in teaching biology in order to enhance meaningful learning and also improve student's optimum academic performance. Secondly, the Kaduna state government through the ministry of education should provide fund for secondary schools to secure instructional material for use by teachers of biology.*

**Keywords:** Academic performance, Activity, Instructional materials, Retention.



## **Introduction**

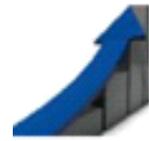
Education can be seen as the aggregate of all the processes by which a learner has developed his or her abilities, attitudinal change and other forms of behaviors in the society. It is the bedrock of human endeavor for developing and transforming the society. It can also be referred to as the experiences one acquired from infant to the time one cease to live. To some extent, everybody is educated but the degree of the individual's education depends largely on the formal or informal training received. Acho and Naswen (2008), defines education as a means for all round development of a person regardless of gender, race, religion social and economic background for a meaningful development of himself and his immediate environment. An important aspect of education is its role in preparing the learners for participation in social and cultural life. Education frequently takes place under the guidance of an educators. According to Abdo and Semela (2010), education can take place in a formal or informal settings and any experience that has a formative effect on the way one thinks, feels or acts may be considered educational. Formal education is widely believed to be an important tool for the achievement of social justice and equity. Thus knowledge acquire from formal education empowers one to assume one's full role in the society and experience a satisfying and productive life.

Three arms of formal education include: Primary, Secondary and Tertiary education. However, Science education is concerned with the acquisition of knowledge through science skills and processes. Globally, there is a shift from traditional method of teaching to Activity Oriented method where learners are allowed to fully participate in hands-on, minds-on in the laboratory either in group or individually. In the process of this learning by doing method, concepts learnt cannot be easily forgotten. The purpose of education according to Bichi, (2008) is not just to make a learner literate, but to add values, rationale thinking, knowledge, skill, self-efficiency and self-independent to their life.

In Nigeria, the National policy on Education (NPE, 2013) clearly spells out the objectives of science teaching from pre-primary to post-primary schools to live effectively in our modern age of science and technology and teaching the students the importance of science and technology in the society.

Biology is one of the core science subjects taught in Nigerian Secondary schools. It is the study of life and therefore plays important roles in harnessing interaction between living things and its environment. Aduwa-ogiebaen and Imogie (2005), Defined Biology as the natural science that studies life of living organisms including their physical structure, development, chemical processes, molecular and mechanism of interactions. According to Agma-Obu (2005), Abimbola and Udonsoro (2007), Activity-based learning/Instructional Materials such as Charts, Pictures, Drawings, Maps and other visual aids are very important in teaching because what students hear can easily be forgotten but what they see cannot be easily forgotten and last longer in their memory. Akinsola (2009) also stressed that the primary purpose of instructional material is to make learning more effective and meaningful.

Academic Performance, this is the outcome or result/feedback of a learner or student after a particular concept has been taught. In biology performance could be attributed to many factors in which teacher's

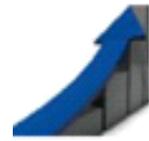


strategy was considered as an important factor. This implies that the mastery of biology concept might not be fully achieved without the use of motivational strategy or method that can enhance learning, (Ayodele, 2009., Bichi, 2012).

Okebukola and Jegede (2010), stressed that a professionally qualified science teacher no matter how well trained would be unable to put his ideas into practice if the school setting lacks the equipment and materials necessary for him or her to translate his competence into reality. Ige, (2006), Daramola, Fatuma and Ayo (2008) and Adebimpe (2009) however, noted that innovation demands adventure. Creativity, curiosity and perseverance on the part of the teacher, such skills are only realizable through well planned training and implementation of appropriate teaching methods. Retention on the other hand is the ability of a learner to recall or retain a concept taught after a period of time. Retention ability of any student depends largely on the intelligent quotient (IQ) of such individual. There are different levels of IQs e.g high, average, low and very low. However, the ability of a learner to retain a learnt concept may depend on the method or strategy in which the teacher uses to deliver his/her lesson. More so, according to a Chinese saying, what a child hears, he forgets, but, what he does he remembers. This is because whatever learnt by doing appeals to all sense organs and memory. It is on this note that the researcher used activity base learning/instructional material to enhance academic performance and retention of senior secondary school students in Sabon-gari educational Zone Kaduna State Nigeria.

### **Statement of the Problem**

In recent years, studies have shown that there is alarming crisis in relation to students' poor performance in science and most especially biology. According to Adeniyi, (2009) in Obochi (2018) biology is one of the major core science subjects taught in senior secondary school level. However, poor performance of the students in the subject has been the major concern to many educators and stakeholders in the subject. This claim is supported by Chief Examiner's reports on students' performance in senior secondary school certificate examination (SSCE and WAEC) 2012-2016. Nwagbo (2006) and Lawal, (2010) observed that most teachers shy away from activity-based learning teaching method and rely on lecture method which is more or less inadequate and inappropriate for meaningful learning to take place. Afuwape and Olatoye (2004), in Oludipe (2011), reported that one of the basic reasons for the lack of interest and poor performance in science subject like biology among student is lack of activity base learning in the classroom using instructional aids and materials. Thus, the question of how the students' academic performance in biology would be improved is still a pedagogical problem (Usman, 2003). It is on this note that the present study aimed at determining the effect activity base/instructional materials on academic performance and retention among SSII biology students in Sabon-gari Local government area Kaduna state Nigeria.



### **Purpose of the Study**

The main purpose of the study was the efficacy of activity-based learning/instructional material on academic performance, and retention among SSII biology students in Sabon-Gari Local Government Area, Kaduna State Nigeria, specifically the objectives of this study sought to: -

1. To determine the effects of activity-based learning using instructional material on academic performance among Senior Secondary School Students in Sabon-gari Local Government.
2. To determine the effects of activity-based learning/instructional materials on retention among the SSII Biology Students.

### **Research Questions**

The study was guided by the following research questions,

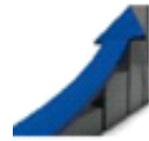
1. What is the difference in the mean academic performance scores of students taught biology using activity-based learning/instructional materials and those taught the same concept using lecture method.
2. Is there any difference on retention ability of students taught using activity-based learning/instructional materials and those taught same concepts using lecture method?

### **Null Hypotheses**

1. There is no significant difference in the mean academic performance scores of the students taught biology concepts using activity-based learning/instructional materials and those taught same concept using lecture method
2. There is no significant difference on retention ability of students taught biology concepts using activity-based learning/instructional materials and those taught using lecture methods.

### **Methodology**

In this study, the researcher employed a quasi-experimental design using pre-test and post-test group design in which two classes were involved and assigned to two different treatments, i.e. experimental and control groups (EG and CG) respectively. The sampled students were pre-tested ( $O_1$ ) to determine the level of equivalence academically. The experimental group were exposed to four weeks' biology lessons using activity-based learning/instructional materials, while the control group was taught same concepts using verbal presentation (lecture). After the treatment, both groups were



subjected to post-test (O<sub>2</sub>) to determine the effect of the treatment on students' academic performance and retention. The targeted population for the study comprises all the SS2 Biology students of public secondary schools in Sabon-gari local government area Kaduna state. Random sampling procedure was used to select the schools for the experiment and intact class was used and a sample size of one hundred and twenty (120) as obtained. Two instruments were developed for the study, i.e. Biology Performance Test (BPT) and Students' Activity Based Lesson Plans (SALP). The Biology Performance Test (BPT) was distributed among the intact class students for post-test and after two weeks. The Biology Performance Test was reshuffled for the retention test. The data collected for the study was analyzed using mean and standard deviation for research questions and t-test statistical tool, at 0.05 level of significant.

Results and Discussion

Answering Research Questions and Testing Null Hypotheses

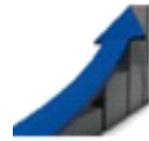
The data collected was analyzed using descriptive statistics Mean and Standard deviation to answer the Research questions while the t-test statistics was used to test the null hypotheses at P<0.05 level of significance.

Research Question 1: what is the difference in the mean academic performance scores of students taught biology using activity-based/instructional materials and those taught the same concept using lecture method?

Table 1: Mean Performance Scores of SS Students taught using Activity base learning /instructional materials and those taught using Lecture Method

Groups	N	$\bar{X}$	SD	Mean Difference
Experimental group (EG)	70	17.60	4.63	4.24
Control group (CG)	50	13.36	4.74	

The descriptive statistics in Table1: shows that there is a difference in mean performance scores between Secondary School II students taught using activity/instructional materials and those taught using lecture methods with a mean difference of 4.24 in favor of those taught using the instructional materials. This implies that teaching using activity/instructional materials has more positive effect on



Biology students as improves their academic performance. However, to find out how significant the difference in the mean scores between the two groups, the data were subjected to an independent samples t-test.

**Research Question 2:** Is there any difference on retention of students taught using activity base/instructional materials and those taught using lecture method?

The post-test scores for SS11 Biology students taught using activity based/instructional materials and those taught using lecture method was analyzed descriptively using mean and the mean difference are presented in Table 2 below.

**Table 2:** Mean Retention Scores of Senior Secondary Students in the Experimental and Control Groups

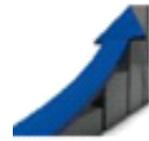
Groups	N	$\bar{X}$	SD	Mean Difference
Experimental Group (EG)	70	24.83	3.24	
				1.99
Control Group (CG)	50	22.84	4.95	

The descriptive statistics in Table 2: shows that there is a difference in mean retention scores of SS students taught using activity/instructional materials and those taught using lecture methods with a mean retention difference of 1.99 in favor of students in the experimental group. This is an indication that students in EG retained what they were taught more than their counterparts in the control group. However, to find out if the difference in the mean retention scores between the two groups is significant, the data was subjected to an independent samples t-test.

**Testing the Null Hypotheses**

The three null hypotheses formulated for the study were tested at 0.05 level of significance.

**Ho<sub>1</sub>:** There is no significant difference in academic performance of students taught using instructional materials and those taught using lecture methods.



To Test Null Hypothesis 1, the posttest means scores of students taught using instructional materials and those taught using lecture methods were subjected to an independent samples t-test. The result is shown in Table 3

Table 3: Summary of t-test Analysis of Post-test Scores of Students in the Experimental and Control Groups

Groups	N	Mean	SD	df	t-cal	p-value	Decision
Experimental	70	17.60	4.63	118	4.90	0.00	Sig.
Control	50	13.36	4.74				

Significant  $p \leq 0.05$

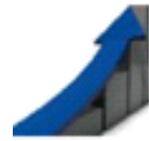
Results of the independent samples t-test statistic in Table 3 revealed that significant difference exists between the academic performance of Senior Secondary II students exposed to activity-based/instructional materials and those exposed to the lecture method. Reason being that calculated p value of 0.00 is less than the alpha level of 0.05. Their computed mean academic performance is, 17.60 and 13.36 for students exposed to instructional materials and those exposed to the lecture method respectively, indicating a mean academic performance difference of 4.24 in favour of Secondary School II students exposed to instructional material. Accordingly, the null hypothesis which states that there is no significant difference in academic performance of the students taught using activity-based/instructional materials and those taught using lecture method, is rejected.

Null Hypothesis 2: There is no significant difference on retention of students taught using activity-based/instructional materials and those taught using lecture methods

To test Null Hypothesis three, the posttest mean scores of both students in experimental and control groups were subjected to an independent samples t-test. The result is shown in Table 4.

Table 4: Summary of t-test Analysis of Retention Scores of Students in the Experimental and Control Groups.

Group	N	Mean	SD	df	t-cal	p-value	Decision
Experimental	70	24.83	3.24	118	2.66		



				0.01	Sig.
<b>Control</b>	50	22.34	4.95		

Significant  $p \leq 0.05$

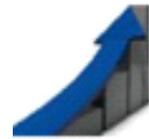
Results of the independent samples t-test statistic in Table 4 revealed that there is a significant difference between the mean retention scores of students exposed to activity/instructional materials and those exposed to lecture method. Reason being that calculated p value of 0.01 is less than the alpha level of 0.05. Their computed mean retention scores are 24.83 and 22.34 for students exposed to activity-based/instructional materials and those exposed to lecture method respectively with a mean difference of 2.49 i.e. (24.83-22.34) implying that students in the experimental group retained what they were taught more than those in the control groups. Therefore, the null hypothesis which stated that there is no significant difference in retention of students taught with instructional materials and those taught using lecture method is rejected. This implies that teaching using activity/ instructional materials helps the students to retain more of what they are taught.

### Discussion of the Findings

This study investigated the effects of activity base learning/instructional materials on academic performance, and retention among Senior Secondary Biology students in Sabon Gari L.G.A of Kaduna State. To achieve this aim two groups of students were formed, the experimental and control groups. Students in experimental group were taught biology using activity/instructional materials while students in control group were taught the same topic in biology using lecture method. The design of the study was post-test quasi-experimental and control groups, a sample of fifty students and seventy (120) SS II students were selected randomly and used for the study. The instrument used for the study that is Biology Performance Test (BPT) and Students' Activity Base Lesson Plans (SALP) were used to collect relevant data which were analyzed using mean and standard deviation for research questions and independent samples t-test statistical tool at 0.05 level of significant for null hypotheses, using Statistical Package for Social Science Software (SPSS).

The result shows a significant difference between the two groups, the data of this study where based on results collected from Biology Performance Test (BPT) and the responses obtained from Students' Activity Based Lesson Plans (SALP). The results of post-test were used to compare the students' academic performance and as well as their retention according to the variable being measured which were analysed according to research hypotheses developed for the study.

Further findings revealed that the students in experimental group who were taught biology using activity-based learning/instructional materials out-performed their counterparts in the control group. The significant difference in academic performance is in favour of the experimental group suggesting a



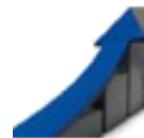
greater impact of the teaching method employed that is, activity based learning via instructional materials over the lecture method in teaching biology. This shows that the use of activity-based and instructional materials in teaching biology is viable in enhancing students' academic performance at secondary school level of education. This agrees with the findings of Popoola (2015) who established that a significant difference exists in the achievements of the two sets of students where schools with adequate instructional materials performed better than those with inadequate instructional materials. Similarly, the finding is also in line with that of Momoh (2010) and Isola (2010) who opined that instructional aids and materials have significant effect on students' retention and also enhance their academic performance in the subject.

Furthermore, the result showed that there was a significant difference in the mean retention scores of students taught biology using activity-based learning/instructional materials. This confirmed the findings of Akinbobola and Folashade (2009) who stated that students exposed to constructivist teaching strategy have higher cognitive performance and high retention ability than their counter parts taught using the conventional teaching method, an indication that treatment given to students help them to improve their performance and also enable them to develop interest and increased retention ability towards the subject. The result was also in agreement with the finding of Iwuji (2012) who stressed that students exposed to Activity-Based/Instructional strategy retained the learnt concepts significantly better than their counterparts exposed to lecture method. This therefore, means that teaching using instructional materials helps the students to be more involved in the learning ie learning by doing process, thereby making retention more permanent than when taught using lecture method. From the result of analysis discussed, it was observed that students that were taught biology using activity based learning/instructional materials had high mean performance score than students who were taught the concept using lecture method.

## **Conclusion**

Teaching using instructional materials is an effective method in teaching biology to secondary school students as the teaching method has encouraged meaningful learning and also improving the academic performance of students in Sabon-Gari Local Government Area of Kaduna State. In the same vain, the study concluded that a significant difference existed in favour of experimental group who were taught biology using activity/instructional materials has it helps to develop and improve academic performance of biology students in senior secondary school, in Sabon-Gari Local Government Area of Kaduna State. Equally, there is significant difference as retention of concepts taught was higher among experimental group over the control group when taught same biology concepts respectively.

## **Recommendations**



Based on the findings of this study, the following recommendations were made;

1. Teachers should make use of instructional materials in teaching biology at secondary school level to enhance and improve students' academic performance and inculcate positive attitudes towards biology.
2. Seminars, workshops and conferences should be organised by school administrators, parents teachers association, science teachers association, ministry of education and other stakeholders to educate and train teachers on the new trend and use of activity via instructional materials in teaching biology for meaningful learning to take place.
3. Government agencies e.g. ministry of education, stakeholders whose responsibility is to design and revise the curriculum for secondary schools should incorporate emphases the use of activity and instructional materials in teaching biology and ensure that it is strictly adhered to.
4. Instructional materials such as charts, pictures, drawings, models and films should be made sufficient for used in teaching biology in senior secondary schools.

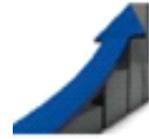
## References

Abdo R. & Semela N. (2010), Motivating African Girls to Science: Removing Social Cultural Barriers. A Paper Presented at the International Conference of Science Education in Developing Countries from Theory to Practice. January 3rd-7th, Jerusalem, Israel.

Abimbola, M.A & Udonsoro I. (2007), Effects of practical Activities on the Achievement of Integrated Science Among Junior Secondary School Students in Kaduna State. *Journal of the Science Teachers Association of Nigeria (STAN)* 28 (1) 102 – 108.

Acho A. & Naswen O, (2008), Resource Utilization in Classroom "The Effect of Learning Activity Package to teach Biology at the Senior Secondary School Level of Education". *Journal of Science Teachers Association of Nigeria (STAN)* 29 (2) 103 – 106.

Adebimpe W. (2009) Effects of Expository Discovery and Discussion Method on Academic Achievement of Junior Secondary Schools. *Chemistry Association of Nigeria (CAN)*. 01(2).79-85



Adeyemi M. A. (2007). Cognitive style as a variable in process skills Development in Science. *Nigeria Journal of Educational Psychology*. 5(1), 45-56

Aduwa-ogiebaen U. & Imogie, O. (2005), Improving Teaching Aids in the Nursery/Primary Schools. *Journal of Institute of Education, University of Jos, Nigeria*.

Afuwape K. & Olatoye, A. (2004), *Modeling; Initiative for obtaining the participation of Girls in Primary schools. Standards for Science, Technology and Mathematics* Educational Research Naser Academic Press. In

Afuwape, A. & Olatoye, H. (2004). Effects of instruction resources on the academic achievements of secondary school students in Ilorin local Government of Kwara State M.Ed Thesis

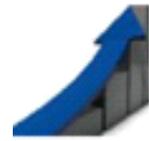
Agma-Obu T. N. (2005). The Relevance of instructional material in teaching and learning Theory and practical of teaching Biology, Port-Harcourt Harey publication

Akinsola O.S. (2009). Utilization of learning materials for developing entrepreneurship skills in classroom: Perception of science and mathematics teachers. In N. Udobia (ed), 50<sup>th</sup> Science Teachers Association of Nigeria annual conference proceedings, 57-60 Heinmann publishers Plc.

Ayodele E. A. (2009). Effective improvisation in primary science 41<sup>st</sup> Science Teachers Association of Nigeria Annual conference proceedings, 339-341 Heinmann publishers plc.

Bichi S. (2008). Effects of Problem Solving Strategy and Enriched Curriculum on Students' Achievement in Evolution Concepts among Secondary School Students. Ph.D. Dissertation Faculty of Education, Ahmadu Bello University, Zaria.

Bichi S. S. (2012). The effect of gender on academic achievement in evolution concept among senior secondary school students using problem solving instructional strategy, *Zaria Journal of students in Education*, 3 (1), 132-138.



Daramola, I. Fatuma A. & Ayo G (2008), *Introducing Educational Technology to Nigerian Students*. New Age Publishers, Enugu, Nigeria.

Ige A. (2006). Develop improvisation skill among biology teachers and student as a strategy for alleviating poverty and ensuring self-reliance in Nigeria, 47<sup>th</sup> STAN Annual conference proceedings 112-117.

Iwuji, N.P. (2012). Effects of activity-based learningteaching strategy on academic achievement and retention in basic science concepts among junior secondary school students. M.Ed Thesis, ABU Zaria

Lawal, F.K. (2010). The extent of the use of selected instructional materials among biology teachers, in selected Secondary Schools in Kano Metropolis. *Journal of Vocational Studies*, Department of vocational and Technical Education, ABU Zaria, 4(1), 131-135)

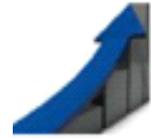
Nwagbo C. (2006). Effect of two teaching method on achievement and attitude of Biology Students' different level of scientific literacy *International journal of educational research* 45(3):216-229.

National Policy on Education (NPE, 2013) *National Policy on Education* NERDC Lagos

Obochi, M. U. (2018) Impact of Problem-solving Strategy on Retention and Academic performance in Biology among male and female students of low ability in SSSII in Zaria, Nigeria. *International Journal of Educational Benchmark* (IJEB) 11(1) 38-50.

Oludipe J. (2011), Effects of Teaching Method on the Learning Process Among Social Studies Students with Varying Learning Characteristics. Ph.D. Thesis, Delta State University, Abraka, Nigeria.

Okebukola J. & Jegede O. (2010), Improvisation and the Effective Teaching of Technology. A paper presented at the 6th Annual Conference of Technological Writers Association of Nigerian, Ibadan.



Okebukola P. A.O & Jegede, O. J. (2010). Students attitude to the use of computer for learning and achievement in biological concepts. *Journal of Science Teachers Association of Nigeria*, 27(2), 61-65

Popoola T. A (2015). An investigation into the relationship between instructional resources and students' academic performance in secondary schools in Abeokuta local government area of Ogun state of Nigeria.

Usman L. A. (2003) Enhancing the academic achievement in biology using instructional materials among senior secondary school students, *Journal of Education Research and Development*. 3(2): 56-58.