

*Full Length Research Paper*

# **Effectiveness of computer-assisted and excursion strategies on senior secondary school students' achievement in Biology towards sustainable development**

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**This study examined the effectiveness of computer-assisted and excursion strategies on secondary school students' achievement in Biology towards sustainable development. The study adopted quazi experimental research design. The population consisted of all the biology students in public senior secondary schools in South West, Nigeria. The sample for the study consisted of 240 senior secondary year two (SS2) Biology students selected from six schools in the three states from South West Nigeria using multistage sampling technique. The subjects were divided into the two treatments and control groups, that is, Computer Assisted, Excursion and control groups. A forty item multiple choice test on Biology was administered to the students after exposing the experimental groups. The treatment is teaching. Three hypotheses were formulated and tested; the data generated were analyzed using t-test and Analysis of Covariance (ANCOVA). The result showed that the achievement of students in the two experimental groups were better than those in the control group. Students taught with excursion strategy achieved better than those taught with Computer Assisted strategy. Also, location has significant effect on achievement while gender has no significant effect on achievement in Biology. Based on the discoveries, it was recommended that Excursion strategies and Computer – Assisted should be employed in the teaching of Biology as innovative strategies.**

**Key words:** Science students, teaching strategy, research, sustainable development.

## **INTRODUCTION**

One of the values which exalt a nation is education. It is the only legacy a parent can bequeath to a child, which will continue to be with the child forever. Education is one sector that contributes greatly to the development of a nation. No wonder, Gerald et al. (2013) believed that

education is an agent of development that helps any society to fashion and model individuals to function well in any environment.

The area of science and technology is the measure of any nations development as technological growth of a

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nation leads to both its social and economic development. Ogunleye and Babajide (2011) asserted that the role of science in this era of technological advancements underlines the importance of scientific knowledge in boosting the image and might of a country. Science has become such a crucial device that no nation with an intention to grow in the socio-economic orbit will bear to downplay its knowledge acquisition in schools. Teacher's roles are very vital to the educational development of a nation. The teachers are expected to devise ways of making their students develop positive attitude towards science. The most important thing is for a teacher to get used to teaching methods that will help students to adhere their learning objectives. In fact, teachers occupy an important position in the teaching and learning of any discipline. Obadare (2005) perceived teachers to be considerably imperative for a successful transformation of the educational system and also considers them to be essential to education advancement. Teachers must be aware that many factors contribute to the overall performance of students, such as teacher's methodology.

Seweje and Jegede (2005) mentioned some methods of teaching commonly used for teaching science in schools such as; discussion method laboratory methods; project method; play way method; guided discovery, Computer – Assisted instruction, Excursion methods and concept mapping among others. Each subject taught in secondary schools has its own peculiarity, which must be applied to suit the methodology in order to achieve maximum success in the teaching – learning processes. Sustainable development is the development that meets the need of the present without jeopardizing the capacity of future generations to meet their own need.

Computer-Assisted Instruction (CAI) is an educational medium in which computers are used to convey instructional content or activities. Students learn by interacting with the computer and then feedback is supplied. Asare (2010) opined that with CAI, learning becomes real, details or issues are obtained; learners learn on their own, learning becomes informal, flexible yet dynamic and whole and taking place everywhere, anytime such that learners get up – to – date information. This will give room for students to learn at their convenient time without coarsing them to do so.

Also Serin (2011) ascertained that students using CAI study better and quicker than students learning from chalk-and-talk instruction alone and also retain whatever they learnt for a period of time. Tareef (2014) found out that CAI students practiced more of time-on-task than students who were exposed to traditional instruction or tools, and reported that CAI incorporate adult learners read for self-directedness, readiness to learn, time perspective and utilization of past experience. There are numbers of teaching strategies that employ a constructivist learning theory to some degree, such as excursion – based inquiry. The use of scientific Excursion

in professional development has emerged as one of the more promising approaches of Dickerson and Dawkin (2002). Excursion provided the opportunity for more individual performance (increase certitude, improved social skill and a greater credence in individual efficacy) for students. Some students discovered that learning could be fun, sometimes to their utmost surprise.

Dillon et al. (2005) focused on the use of school field centre and farm grounds, provided proof across in range of subject that children's outdoor learning can include values and beliefs, attitudes and feelings, knowledge and understanding, actions and behaviors, personal development and social development. For many teachers and students engaged in fieldwork, the chances for personal and social development are seen as highly important. Also, due to the memorable nature of the excursion setting, they have positive impact on long-term memory

### **Statement of problem**

In Nigeria education sector, most teachers still find it difficult to adopt some innovative methods in teaching science especially Biology. The teachers shift the blame on the inability of the government to purchase most of the gadgets needed. It was observed that, some methods of teaching seem not to engage students in critical thinking and not often give room for participation. A good classroom activity ought to give room for participation, interaction, co-operation and reflection. The conventional methods lack this qualities and this is a great disadvantage. Students who were taught with conventional method may not be able to solve problems on their own. The skill with which they could solve problem are not usually embedded in conventional methods.

### **Purpose of the study**

The study was to determine the effect of Computer-Assisted and excursion strategies of teaching on senior secondary school students' achievement in Biology.

### **Research questions**

The following research questions were raised to guide the study;

- (1) Would there be any difference in the achievement mean scores of students exposed to Computer Assisted and excursion strategies and their counterpart in control group?
- (2) Would there be any difference in the achievement mean scores of male and female students exposed to Computer Assisted strategies and their counterparts

**Table 1.** ANCOVA showing achievement mean scores of students.

Source of variation	SS	DF	MS	F cal	P
Corrected model	2354.044	3	784.681	47.642	0.00
Covariate (pretest)	7.977	1	7.977	0.4884	0.488
Group	2295.031	2	1147.515	69.671	0.000
Error	1416.456	236	16.470		
Corrected total	3770.500	239			
Total	36833.000	240			

exposed to excursion strategy?

### Research hypotheses

- (1) There is no significant difference in the achievement mean scores of students exposed to Computer Assisted excursion strategies and their counterparts in control group.
- (2) There is no significant difference in the achievement mean score of male and female students taught with Computer Assisted and excursion methods.

### RESEARCH DESIGN

The design adopted for the study was quazi experimental, pretest – post test control group which is as follows:

Experimental group I (CAI)  $O_1 X_1 O_2$   
 Experimental group II (Excursion group)  $O_3 X_2 O_4$   
 $O_5 C O_6$

Where  $O_1, O_3, O_5$  = pretest observations  
 $O_2, O_4, O_6$  = post test observations  
 $X_1$  = treatment (CAI)  
 $X_2$  = treatment (excursion method)  
 $C$  = Convention Method

### Sample and sampling techniques

The sample for the study consisted of 240 SSII Biology students selected using multi stage sampling procedure from the three states in south-west, Nigeria. Two local government areas were selected using random sampling technique. The six schools used were selected using random sampling techniques. The forty students from each school were made up of twenty girls and twenty boys who were chosen through stratified sampling from the SS2 class of each school.

### Research instrument

The research instrument used for the study was Biology Achievement Test (BAT). It consisted of forty multiple choice test items based on the selected topics in Biology. Also, adopted Computer Assisted Instruction packages were used.

### Experiment procedure

The students that participated in the study were randomly

designated to the two treatment groups while the pretest was given to them. The first treatment group was instructed using Computer Assisted package while the second treatment group was instructed by taking them out to the site applicable to the topic chosen. The control groups were left with the normal classroom teaching (conventional method). The treatment was lasted for six weeks. The Biology achievement test was administered to know the effect of the treatment given.

### RESULTS

$HO_1$ : There is no significant difference in the achievement mean scores of students taught with Computer – Assisted excursion strategies and their counterpart in control group.

Table 1 illustrates that there is considerable difference in the achievement mean score of students taught with Computer – Assisted, excursion strategies and those in control group.  $F_{cal} = 69.671$ ;  $p < (005)$ . The null hypothesis was rejected which implies that there is considerable difference in the achievement mean scores of students in the three groups.

In order to ascertain the efficacy of the treatment on students' achievement in Biology, Multiple Clarification Analysis was carried out. The result is given in Table 2. Table 2 shows that students taught using excursion strategy had the highest adjusted mean score of 29.26 (22.86 + 6.40) in Biology achievement test. The Computer- Assisted strategy group had an adjusted mean score of 24.73 (22.86 + 1.87) while those in control group had the least adjusted mean score of 14.59 (22.86+ (-8.27)). This implies that Excursion and Computer -Assisted strategy is enhance students' achievement in Biology. The treatment accounted for 68% ( $\eta^2 = 0.68$ ) of the observed variance in students' achievement in Biology.

$HO_2$ : There is no significant differences in the achievement mean score of male and female students taught with excursion ad Computer – Assisted strategies.

Table 3 shows that  $F_{cal}$  (1.709) is less than  $F_{tab}$  (3.86) at 0.05 level of significance. The null hypothesis is not rejected. This implies that there is no significant variance in the achievement means scores of male and female students taught with excursion and Computer-Assisted strategies.

**Table 2.** Multiple Clarification Analysis(MCA) showing the achievement of students in Computer-Assisted, Excursion and control groups.

<b>Grad mean = 22.86</b>						
<b>Variable + category</b>	<b>N</b>	<b>Unadjusted deviation</b>	<b>Eta</b>	<b>Adjusted for independent + covariate</b>	<b>Beta</b>	
Control	80	-8.87		-8.27		
Computer – Assisted strategies	80	1.80	0.68	1.87		
Excursion strategies	80	6.46		6.40		16
Multiple R				0.165		
Multiple R				0.018		

**Table 3.** ANCOVA showing achievement mean scores of student in the excursion and Computer – Assisted strategies by gender.

<b>Source</b>	<b>SS</b>	<b>DF</b>	<b>MS</b>	<b>F cal</b>	<b>F tab</b>	<b>P</b>
Corrected model	3228.241	6	786.062	28.433	2.68	0.000
Covariate (pretest)	1262.874	1	1062.874	38.746	3.86	0.582
Gender	8.86	1	8.86	4.46	3.86	0.254
Group	1946.431	2	1946.431	64.738	3.86	0.000
Gender group	52.828	1	52.828	1.709	3.86	0.014
Error	8872.745	231	32.684			
Corrected total	9896.268	239				
Total	168684	240				

## DISCUSSION

The findings of the study demonstrated that there was significant difference in the achievement mean score of the group guided with excursion, Computer- Assisted and conventional strategies. This indicates that there was an improvement in the achievement of students resulting from their exposure to treatment. This implies that excursion strategies enhance student's achievement in Biology. This is in agreement with Dickerson and Dawkin (2002). They asserted that the use of scientific excursion in professional development as emerged as one of the more promising approach. Also Dillon et al. (2005) believed that due to the memorable nature of the excursion setting, teachers and students have positive impact on long-term memory. Also, it is in agreement with Serin (2011) that students taught with Computer-Assisted strategy study better and quicker than students learning from chalk-and-talk instruction alone and also retain whatever they learnt for a period of time. The discoveries of their research further revealed that gender had no crucial effect on students' achievement in Biology. This implies that female students are found to be as good as their male counterpart. This is in agreement with Babajide (2010) who found out that gender has no significant influence on achievement in science.

## Conclusion

Based on the findings of the study students exposed to

excursion and Computer-Assisted strategies had a remarkable improvement in their achievement. This implies that the use of these strategies would be very effective and efficient in enhancing students' achievement in Biology.

## Recommendations

Based on the discoveries gathered from the study, it was recommended that Usage of innovative strategies such as excursion and Computer – Assisted strategies should be adopted by science teachers in all secondary schools. Government should organize and sponsor teachers to attend workshops, seminar and conferences on the use of innovative strategies. Science teachers should try as much as possible to be up and doing in the area of using innovative instructional materials to impact knowledge to students.

## CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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