

## **OUTDOOR CLASSROOM INSTRUCTIONAL STRATEGY AND GENDER AS DETERMINANTS OF STUDENTS' ACHIEVEMENT IN BIOLOGY IN IBADAN MUNICIPALITY, OYO STATE**

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**Oluwatosin Funmilola Oladiran & Dorcas Omolara Oyawole**

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*Department of Science and Technology Education, University of Ibadan, Ibadan  
General Studies Education Department, Federal College of Education (Special), Oyo  
Email:tosinfunmioladiran@gmail.com, ayaoyawole2007@gmail.com*

### **ABSTRACT**

Poor achievements of students recorded in Biology has been linked to the Conventional strategies been employed by Biology teachers taking the subject. There is need to employ relevant and practical instructional strategies. Researchers have suggested the use of Outdoor Classroom Instructional Strategy (OCIS) particularly among both student genders in senior secondary schools. It has been found that these variables have not been adopted in the teaching of Biology concepts. This study therefore determined outdoor classroom instructional strategy and gender as determinants of students' achievement in biology

The pretest-posttest control group quasi-experimental design with was adopted. Two hundred and twenty three SS1 students from six randomly selected senior secondary schools in two local government areas of Ibadan Municipality, Oyo State were used for the study. The schools were randomly assigned to experimental (OCIS) and control (CIS) groups and the study lasted for twelve weeks. Five instruments were used namely: Teachers Instructional Guides for teachers using the treatment and control groups, Biology Students Achievement Test ( $r=0.84$ ), and Assessment Sheets for evaluating research assistants. Two null hypotheses were tested at 0.05 level of significance. Data were analyzed using ANCOVA.

Treatment had significant main effect on students' achievement score ( $F_{(1,222)} = 178.08$ ;  $p < 0.05$ ). OCIS ( $\bar{x} = 17.47$ ) enhanced achievement scores than and CIS ( $\bar{x} = 10.86$ ). Outdoor Classroom Instructional strategy improved students' achievements in biology for both student genders.

**Keywords:** Outdoor Classroom Instructional Strategy, Gender, Biology and Achievement.

## **INTRODUCTION**

Biology occupies a unique position in the senior secondary school curriculum in Nigeria and it is central to many science related courses such as medicine, pharmacy, agriculture, nursing, biochemistry and so on. According to the National Policy on Education (FRN, 2013), the goal of primary education is the laying of a sound basis for scientific and reflective thinking and while the goal of secondary education is aimed at providing well trained manpower in applied science, technology and commerce at the sub professional grades. Hence the major objective of teaching biology in school is not only to communicate the spirit of science but also to ensure that students acquire skills of science.

It is obvious that no student intending to study these disciplines can do without Biology (Yusuf and Afolabi, 2010). These factors, among others, have drawn attention of researchers and curriculum planners towards biology as a subject in the school curriculum (Kareem, 2003). In spite of the importance and popularity of biology among Nigerian students, performance at senior secondary school level had been poor (Ahmed, 2008). In the National Policy on Education (FRN, 2013), each senior secondary school student is expected to study at least a science subject (one of Biology, Chemistry, Physics or Health science)

The main objectives of the biology curriculum as provided in the National Policy of Education (FRN, 2013) are to prepare students to acquire: adequate laboratory and field skills in biology, meaningful and relevant knowledge in Biology, ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture and reasonable and functional scientific attitudes.

As important as knowledge of biology is to human beings, the performance of students in senior secondary sciences in Nigeria has remained consistently poor. Sam (2011) observed that academic excellence had been in state of constant decline.

Reports from the past results of student in biology examinations have shown that students perform poorly at such examinations.

**Table 1: Candidates' Performance in May/June Senior Secondary School Certificate Examinations in Biology in Nigeria 2002-2012**

	No of Candidates	No of Candidates	No of Candidates	% of Candidates	% of Candidates
Year	Total entry	Total sat	Credit Pass (1-6)	% Passes	Failure Rate
2002	1,240,163	882,119	278,112	31.52	68.50
2003	1,006,831	909,101	392,249	44.15	55.85
2004	1,005,553	1,027,938	253,487	24.69	75.31
2005	1,080,162	1,072,607	375,850	35.04	64.96
2006	1,170,522	1,152,045	559,854	48.60	51.40
2007	1,270,137	1,238,163	413,211	33.37	66.63
2008	1,292,910	1,259,964	427,644	33.94	66.06
2009	1,372,567	1,903,552	644,733	33.87	66.13
2010	1,331,381	1,300,418	427,644	33.90	66.10
2011	1,540,141	1,505,199	579,432	38.50	61.50
2012	1,695,878	1,672,224	649,156	38.81	61.58

**Source: Statistics section, WAEC National Head Office, Yaba Lagos, Nigeria.**

Every academic year, the nation is faced with the below average performance of thousands of students in national examinations conducted by the West African Examination Council (WAEC) and the National Examinations Council (NECO), where only 20 per cent of the candidates pass at acceptable credit level. The desire to know the causes of the poor performance in Biology has been the focus of researchers for some time now. It has been observed that poor performance in the sciences is caused by the poor quality of science teachers and overcrowded classrooms (Kareem, 2003) and biology classes are heterogeneous in terms of ability level (Yoloye, 2004). In addition, the laboratories are ill-equipped (Ahmed, 2008) and the biology syllabus is over loaded (Cimer, 2004). It has been researched that how students perceive the learning environment in biology affects their learning (Cakiroglu, Telli and Cakiroglu, 2003).

Some authors also investigated reasons for students' low achievement in biology. Among the reasons were teachers' instructional techniques (Imhanlahimi and Aguele, 2006), students' inability to understand lessons (Adeyemo, 2005) and low teacher quantity (Saka, 2006). It has also been suggested that there are also indirect influences such as roles played by parents in their children's education (Wilson, Smeeding & Haveman, 2007). While every situation in every community, nation or educational system may be different, there is no doubt that teachers as well as parents/guardians have a great responsibility to help students succeed, the students should be assisted to hold and positively discharge the most responsibility (Wenglinsky, 2002).

It is evident that traditional teaching strategy is no longer effective for teaching Biology as it leads to rote learning and inability to apply knowledge to new and unfamiliar situations (Young and Collin, 2003). The search for innovative teaching

strategies is borne out of the fact that different teaching-learning situations (concepts being taught, skills intended to be developed in learners, teaching topics) demand for different teaching approaches to be used (Young and Collin, 2003).

It has also been accepted that an effective strategy for achieving better examination results was to create and maintain more effective learning environments through the development of more student-centered classrooms and greater reflectivity in classroom interactions of teachers. Achor (2008) considered some teaching modes as learner-centered, interest arousing and activity oriented. They include conceptual change strategy, concept mapping, field excursion, guided-discovery, experimental/laboratory and demonstration methods. The teacher is expected to use different techniques, methods and media to facilitate learning in the classroom. When lectures are augmented by examples, questions, demonstrations, and visual presentation, teaching becomes more appropriate, according to Efebo (2006).

This study was conceived as a result of students' complaints about the difficulty of learning biology at the secondary school level. The zeal and desire to learn biology needs the application of the relationship between concrete objects and abstract ideas (Ozcan, 2003). This study considered the use of outdoor classroom instructional strategy to help students develop interest in Biology, improve their achievement and take charge of their learning.

An outdoor classroom is an outdoor educational facility that can be developed into a natural study grounds for educators, students and anyone interested in the natural environment. So basically, an outdoor classroom is any site outside of the school building that is used by teachers and students as a place for learning. Every school has an outdoor classroom; the Outdoor

Classroom comes in different sizes and shapes, hosts a diversity of resources, and is used by students and teachers for a variety of purposes. The outdoor classroom is right outside the classes' windows and doors; outside every school building, a blossoming world of "natural studies" with all types of structures that can do a better job of teaching than video tapes and computers exists, as students often learn best by "doing." All subjects or curriculum can be presented in an outdoor classroom and outdoor classrooms support curriculum objectives in all program areas. The trick is to make sure that outdoor learning is based upon the existing curriculum. It should not be an extra or add-on.

The recent Department for Education and Skills (2004) enquiry into Education outside the Classroom as well as OFSTED's (2004) report on Outdoor Education are reflections of this trend. The OFSTED report into outdoor education in 2004 noted 'outdoor education continues to thrive where head teachers and individual enthusiasts provide leadership and a vision. They recognize the importance of outdoor education experiences in giving depth to the curriculum and to students' personal and social development. Two recent research publications – an NFER/King's review of research on food and farming education (Dillon, Rickinson, , Sanders, Teamey,. and Benefield, 2003), and a CEE/Bath evaluation of the Growing Schools Innovation Fund Projects (Scott, Reid and Jones, 2004) - have each highlighted the need for stronger empirical and conceptual understandings of learning in the outdoor classroom

Children are naturally drawn to the outdoors (Keeler, 2008). The outdoor classroom allows children the opportunity to observe natural phenomena first hand (Martin, 2000). Outdoor classrooms are powerful vehicles to achieve educational goals. They naturally motivate young people to learn. An outdoor classroom provides an opportunity to experience natural and human-created

characteristics of the environment in a natural setting. An exciting way to teach youth how plants grow and animals survive is to let them mill in the soil and catch grasshoppers in the grass (University of Tennessee Extension, 2006). According to Dillon, Rickinson, Sanders, Teamey, and Benefield, (2005), the intended outcomes of outdoor experiences can encompass gains in knowledge and understanding, attitudes and feelings, values and beliefs, activities or behaviours and personal and social development.

Schools provide a context in which dynamics of male and female relationships are constantly in effect and can be addressed. Gender is a range of physical, mental and behavioral characteristics distinguishing between masculinity and femininity. Depending on the context, the term may refer to sex (i.e. the state of being male or female), social roles (as in gender roles) or gender identity. Classroom observational studies have shown that girls are not given enough opportunities for classroom participation as the boys by both male and female teachers (Okebukola, 2013). Boys are given greater opportunities to ask and answer questions, to manipulate materials and to lead groups, these factors hinder performance of the girl-child (Okebukola, 2013). This study is therefore geared towards examining the impact of outdoor classroom and gender on students' achievement Biology.

### **STATEMENT OF THE PROBLEM**

This study therefore sought to determine the effects of outdoor classroom and gender on students' achievements in Biology at the senior secondary school level in some selected secondary schools in Ibadan.

## **Hypotheses**

The following two null hypotheses were tested at significance level of 0.05 for the purpose of this study.

H<sub>01</sub>: There is no significant main effect of treatment (outdoor classroom) on students' achievement in Biology.

H<sub>02</sub>: There is no significant main effect of gender on students' achievement in Biology.

## **MATERIALS AND METHOD**

This study adopted pretest-posttest, control group, quasi-experimental design Senior Secondary School one students were used in the study. Six secondary schools were randomly selected from two randomly selected Local Government areas of Ibadan Municipality, Oyo state. One class was randomly selected from the SS1 classes in each school. Intact classes were used.

The criteria for selection of schools

A random sampling was adopted in selecting schools used for outdoor classroom, pictorial presentation and the conventional instructions based on the following criteria:

- i. The school is a government school
- ii. Availability of experienced biology teacher with at least three years of teaching experience
- iii. Willingness of members of staff to participate in the study
- iv. Evidence that the students have already been exposed to the basic concepts necessary for the understanding of the topic.
- v. Accessibility of the school

## **Research Instruments**

Five instruments constructed by the researcher were used in this study to collect data:

- i. Biology Students' Achievement Test (BSAT)



- ii. Teachers' Instructional Guide on Outdoor Classroom Instructional Strategy (TIGOCIS)
- iii. Teachers' Instructional Guide on Conventional Instructional Strategy (TIGCIS)
- iv. Evaluation Sheet for Assessing Teachers' Performance during Training (ESAT) on Outdoor Classroom Instructional Strategy
- v. Evaluation Sheet for Assessing Teachers' Performance during Training (ESAT) on Conventional Instructional Strategy

### **Biology Students' Achievement Test (BSAT)**

The instrument is divided into two sections A and B; section A consists of the personal data of the subject such as the gender, name and school. Section B consists of (20) multiple-choice items. The BSAT which initially consisted of 40 – item multiple questions with four options was constructed by the researcher to measure the students' acquisition level in some Taxonomy/Classification of organisms' related questions in Biology. The 40 questions were given to experts in Biology Education to be scrutinized, after the scrutiny some items were modified and 20 questions out of the 40 survived. The 40 items were trial tested on SSS 1 Students in another school different from the sample and the discriminating level was ascertained, all the difficult questions and too easy questions were shed off thereafter.

**Table 2: Table of Specification for Biology Students' Achievement Test (BSAT)**

CONTENT	COGNITIVE LEVEL			Total
	Remembering (Knowledge recall)	Understanding (Comprehension and application)	Thinking (Analysis, synthesis and evaluation)	
Hierarchy of Living Organisms		9 (1)	1 (1)	2
Binomial Nomenclature	6 (1)	8 (1)		2
Animal Kingdom	14, 15, 16 (3)	2, 5, 8 (3)	3,4 (2)	8
Plant Kingdom	10, 13, 20(3)	7, 11, 12 (3)	17, 19 (2)	8
<b>Total</b>	7	8	5	20

**The RUT was obtained from Okpala and Onocha 1995. Validation of (BSAT)**

The average difficulty and discriminating indices were determined after the instrument was trial tested on a sample of students. The difficulty and discriminating indices range from 0.40 and 0.60, while reliability coefficient of 0.84 was obtained using Kuder Richardson (KR.20). Items that fall within discriminating indices of 0.4 and 0.6 were selected and 20 items survived final scrutiny.

**Teachers' Instructional Guides (TIG)**

These are the Teachers' Instructional Guides that were prepared by the researcher for the teachers on outdoor classroom, pictorial presentation and conventional strategies. These were used during the period for the experimental and control groups. The instructional guides are:

- i. Teachers' Instructional Guide on Outdoor Classroom Instructional Strategy (TIGOCIS)

- ii. Teachers' Instructional Guide on Conventional Instructional Strategy (TIGCIS)

### **Teacher's Instructional Guide on Outdoor Classroom Instructional Strategy (TIGOCIS)**

The TIGOCIS is an operational guide on outdoor classroom strategy that was used by the teachers to allow for uniformity in the teaching method and to ensure that the goals of the lessons were met. This guide actively involves the students in learning about plants' and animals' classification in order for them to have knowledge of the topic and also enhanced students' understanding of the topic.

Steps involved in Teacher's Instructional Guide on Outdoor Classroom Instructional Strategy (TIGOCIS)

- i. Teacher leads the students out of the class to the school compound/ field to familiarize them with plants and animals in the environment.
- ii. Teacher introduces the topic and selects concepts required to teach the students
- iii. Students are divided into groups by the teacher and each group is asked to pluck different types of plants and catch different types of animals
- iv. Teacher leads and directs teaching on the topic by using the plants and animals brought by the students while actively involving the students in the lesson
- v. Students' groups summarize and present their findings while the teacher asks questions to assess their knowledge of the subject matter.
- vi. Students ask questions.
- vii. Students are led by the teacher back to the classroom.
- viii. Students copy note from the chalk board.
- ix. Teacher goes round the class to supervise the pupils while copying the note given to them.

- x. Teacher corrects pupils' mistakes where necessary
- xi. Students write down assignment.

### **Teacher's Instructional Guide on Conventional Instructional Strategy (TIGCIS)**

This is an instructional guide for teachers participating in the classroom using the conventional method of teaching. It contains the statement of topic, objectives, instructional materials and the procedure expected to be followed by the teachers in teaching classification of plants and animals in the classroom. This was prepared and was used in the training of teachers to allow for uniformity in the teaching method.

- i. The teacher reviews the previous lesson and introduces the new topic.
- ii. The teacher teaches new lesson.
- iii. The teacher writes note on the chalk board for students to copy
- iv. The teacher asks few questions from the students to test whether they understand the topic.
- v. The teacher summarizes the day's work.
- vi. The teacher gives assignment.

### **Validation of Teachers' Instructional Guides**

The teachers' instructional guides were validated by Biology teachers and Biology Educators for evaluation and assessment. The face validity of the teachers' instructional guides was done by showing the items to three (3) Science Educators to determine its suitability in terms of clarity of ideas, language of presentation, class level, coverage, relevance, and application to the study.

### **Evaluation Sheet for Assessing Teacher Performance during Training (ESATPT)**

This instrument was designed to be used in evaluating the teachers' effective use of the instructional guides during the

teaching process. It shows their presentation of concepts, mastery of the topics, use of materials and activities as directed and how effective their presentation was for the mastery of concepts by the students. It was used for evaluating performance of the trained teachers on the use of these strategies:

- i. Outdoor Classroom Instructional strategy
- ii. Conventional method Instructional Strategy

This rating scale is made up of two sections

**Section A:** this consisted of the personal data of the trained teachers containing name, school, period, class taught, date and summary of the concept discussed in the class.

**Section B:** this consisted of different traits/stages of the instructional strategy to be evaluated. This items were placed on a-5 point Likert rating scale ranging from very good(VG), Good (G), Average(AV) Poor(P) and Very poor(VP)

## **Research Procedure**

### **Work Schedule**

The following time schedule was adopted:

1 week for training of teachers

1 week to scrutinize teachers on the use of Outdoor classroom Instructional Guide using ESATPT

1 week for Pretest

8 weeks for Treatment

1 week for Posttest

This makes a total of 12weeks

### **Training of teachers**

Training was done step by step through the explanation on the teaching guides on outdoor classroom and pictorial presentation strategies. The researcher visited the biology teachers in their schools and trained them on how to go about the instructional and experimental procedures. The areas of disparity of ideas were

discussed and the reason why the guide should be used as expected was explained.

Two teachers were trained as research assistants for the experimental groups while the teachers who were to use the conventional method of teaching were asked to adhere strictly to the guide based on the lesson plan drawn from the curriculum. The training of teachers as research assistants lasted for 1week.

### **Administration of Pre-test**

The second week was used by the researcher and the trained teachers as research assistants to administer the pre-test on the participating students using the Biology Students' Achievement Test (BSAT). The instrument was administered to the students to test their level of understanding and acquisition of knowledge of classification of plants and animals in Biology so as to be able to compare the effect of the treatment on them.

### **Treatment**

The treatment was carried out on the experimental and control groups. The fifth to eleventh weeks were used for the implementation of the treatment for both the experimental and control groups teaching the classification of plants and animals.

### **Post Test**

The Biology Students' Achievement Test (BSAT) was administered to the students at the end of the treatment to determine the extent of the effect of outdoor classroom and pictorial presentation instructional strategies on students' achievements in Biology

### **Method of Data Analysis**

Analysis of data collected in relation to this study was done using Descriptive Statistics (mean, standard deviation) including Bar charts to explain the mean distribution of the various groups. The

data was also analyzed using inferential statistics of Analysis of Covariance (ANCOVA) of the posttest scores with the pretest scores as the covariates. Multiple Classification Analysis was used to determine estimated marginal means of different groups.

## RESULT

**H<sub>01</sub>: There is no significant main effect of treatment (outdoor classroom) on students' achievement**

Table 3 represents the summary of ANCOVA results on subjects' post test achievement scores.

**Table 3: ANCOVA table showing the significant main and interaction effects of Treatment and Gender on the Pre-Post Achievement of Students to Biology**

Source	Sum of Squares	DF	Mean Square	F	Sig.	Eta Squared
Corrected Model	2333.408	12	194.451	46.121	.000	.725
Pre-Achievement	9.328	1	9.328	2.212	.138	.010
<u>Main Effect :</u>						
Treatment Groups	750.802	2	750.802	178.080	.000	.629
Gender	.183	1	.183	.044	.835	.000
Error	885.381	210	5.422	2.684	.103	.013
Total	54905.000	223	4.216	1.286	.279	.012
Corrected Total	3218.789	222				

R.Squared = .725 (Adjusted R. Squared = .709) \*Significant at P<.05

Table 3 revealed that treatment had a significant effect on students' post-test achievement scores  $F_{(1,222)} = 178.080$ ,  $P < .05$ ; partial eta squared = .629). The effect size of 62.9% was fair. Hence, the null hypothesis is therefore rejected. This means that there was a significant difference in the mean achievement scores of subjects exposed to Outdoor Classroom and Conventional Instructional strategies. On the basis of this finding, hypotheses 1 was rejected.

To find out the magnitude of the mean scores of the group's performance Table 4 is presented

**Table 4: Estimated Marginal Means of Posttest Achievement Scores by Treatment and Control Group**

Grand Mean= 15.22

Treatment	Mean	Std Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Outdoor Classroom	17.472	.311	16.852	18.092
Conventional	10.857	.229	10.402	11.312

Table.4 revealed that students in the Outdoor Classroom treatment group ( $\bar{x} = 17.472$ ) followed by the Conventional strategy group adjusted mean achievement scores ( $\bar{x} = 10.857$ ). The grand mean being 15.224.

**Ho 2: There is no significant main effect of gender on students achievement in Biology.**

Table 2 revealed that gender had no significant effect on students' achievement in Biology. ( $F_{(1,222)} = .044$ ;  $p > 0.05$ ; partial eta squared = .000). Therefore, hypothesis 2 was not rejected

**DISCUSSION**

There was significant difference in the effect of treatment on achievements of the students exposed to Outdoor Classroom



Instructional Strategy. This finding shows that Outdoor Classroom enhanced students' achievements over and above the Conventional Instructional strategy. These may be attributed to the methods and steps involved in Outdoor Classroom Instructional Strategy developed and implemented in the course of the study in which the learners were allowed to participate in different learning activities by "doing" which enabled them to observe natural phenomena first hand, formulate their own knowledge of the concepts selected for the study as they individually or in their groups use their reasoning skills to recall facts, observe, collect and categorize the living organisms in the environment.

This finding is related to the findings of research conducted by Hamilton Ekeke (2007) using Outdoor Classroom Instructional strategy. It was found that the students who had first hand experiences in the field's achievement scores significantly improved.

The poor performance of the conventional Instructional Strategy (control) group in the posttest achievement mean score when compared with the other treatment groups' mean scores may not be unconnected with the fact that the group was taught with the method that involved rote learning and memorization, teacher-centered with little or no interaction with the teacher and their classmates. Also, it may be as a result of inadequate field work on the part of the students which is an attribute of the conventional method. That is, the conventional method does not seem to involve students with related activities which they need to go through in an attempt to accomplish a given task. Thus the relatively low achievement in conventional lecture method group repeats itself in this study as it was the findings of Oludipe and Oludipe (2010), Young and Collin (2003), This is because the

conventional method makes the teacher the sole information giver to passive students.

## **CONCLUSION**

The findings in this study is in agreement with the research work of Ogundiwin (2013) who believed that strategy learning encouraged students to take control of their learning (as they are learner centered), Olagunju (2002), that strategy learning lead to sustainable development in our country, Schnotz (2002), Ekeke (2007), that strategy learning improves content learning and Thorborn and Allison (2010) who also confirmed the fact that learner centered strategies learnt and properly implemented by teachers improve learning outcomes.

Based on the findings of this study, it could be concluded that Outdoor Classroom Instructional Strategy is more effective for the dissemination of teaching-learning content during Biology classes in the secondary schools than the conventional method. It could be concluded that Outdoor Classroom facilitate learning outcomes particularly in achievement in Biology than the conventional method. The strategy had inculcated into the students that Biology could be leant first hand through the natural environment and through various visual images and illustrations thus bringing the lessons alive in the classrooms.

Finally, the government and other stakeholders in education can help in enhancing students' achievement by encouraging teachers to use Outdoor Classroom Instructional Strategy in their various Biology classes.

## **Contribution of the study to Knowledge**

This study has contributed to knowledge generally in the following ways:

- Outdoor Classroom Instructional strategy had been found to be effective in enhancing students' achievements in Biology as revealed by the findings in the study. This result has provided a basis for curriculum innovation in the training, retraining and in-service programme of would-be Biology teachers and those who are already in the field respectively.
- The provision of adequate learning environment including natural habitat around the schools and well designed Outdoor Classroom compatible instructional materials as revealed in this study will improve achievements of students in Biology.
- This study has also shown that Outdoor Classroom Instructional strategy exposed students to a higher thinking order needed to recognize assumptions, evaluate controversy, and scrutinize inferences in reducing the problem of poor students' learning outcomes in Biology.

### **Educational Implications**

The exposure of the learners to Outdoor Classroom instructional strategy have been found to positively affect the enhancement of students' achievements in Biology. The findings have therefore revealed importance of using these instructional strategy that are participatory and learner centered where learners are given opportunities to learn in more practical and interactive ways. The strategy of teaching also had long-lasting effect on cognitive outcomes. The pupils who were taught biology outdoors seemed to have experienced a more contextualised, hands-on science education where they were active participants. The study also revealed that there is need to incorporate in our educational system Outdoor Classroom instructional strategy because they are potentially powerful in improving students' achievements in biology as they see the subject not as something only to read

about in books but as something they can be part of and that is relevant in their everyday life.

## **RECOMMENDATIONS**

In the light of the results and discussion, the following recommendations are made:

Outdoor Classroom instructional strategy should be adapted for teaching and learning Biology because these are viable teaching strategy that have been observed to have brought about significant achievements of students in Biology.

Teacher training institutions should upgrade the curriculum of the pre-service teachers to ensure that adequate training is given to them in the area of these innovative strategies (that is, Outdoor classroom) to enhance the competence and confidence of biology teachers in order to improve the overall achievements of students in Biology.

Teachers should take cognizance of interest of students in mediating learning towards resolving educational problems that may arise from time to time in our country for a sustainable development.

Teaching strategies such as Outdoor Classroom and that reduce the gender difference in students' achievements as recorded in this research could be used as a basis reducing anxiety in learning for both male and female students.

Government and other employers of labour should ensure should ensure that qualified and competent teachers are engaged for teaching Biology in Secondary schools. A successful use of Outdoor Classroom and Pictorial Presentation instructional strategies requires that the teachers who will initiate the

strategies should be flexible, sound and knowledgeable enough to guide the students.

Government should ensure adequate outdoor classrooms are provided and maintained in all the secondary schools and also ensure that appropriate visuals that elicit imagery are provided for the schools for the successful implementation of pictorial presentation.

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