



## Impact of Interactive Teaching Strategy on Interest and Performance in Ecology among Secondary School Students in Kano State, Nigeria

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### ABSTRACT

The study investigated the impact of interactive teaching strategy on interest and performance in ecology among secondary school students in Kano State, Nigeria. Quasi experimental/control groups design involving pretest and posttest was used for the study. The population consisted of 1650 SSII students. A sample of 123 subjects of both male and female students were divided into 63 male and female for experimental group and 60 male and female for the control group were selected by random sampling technique. The instruments used for data collection are, Ecology Performance Test (EPT) and Students Interest Questionnaire Scale (SIQS) with reliability coefficient of 0.75 and 0.83 respectively. Two research questions and two null hypotheses were stated and used to guide the study. The data collected were analyzed using mean, t-test and ANOVA statistics at significant level of  $p \leq 0.05$ . Findings from the analysis of the data revealed that there was significant difference in the mean scores of experimental and control groups in favour of experimental group. There was no significant difference in the mean scores of male and female students exposed to interactive teaching strategy. There was significant different in the interest of students after being taught ecology concept using interactive teaching strategy and those taught with lecture method in favour of interactive teaching strategy. Based on these conclusions, it was recommended that interactive teaching strategy should be used by science teachers to teach biology students at senior secondary school level.

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### INTRODUCTION

Science education concentrates on teaching of science concepts, facts, science approach and self-reliance (Adeyemi, 2010). Science education is the field of study which is also concerned with teaching science

content and process to individuals not traditionally part of the scientific community (Yunusa, 2014). Okafor (2004) sees science education as the process of learning that places emphasis on skill acquisition through the use of various



scientific processes like observation, question, hypothesis, and experimentation, collection of data, theory and law, used in learning science subjects like physics, chemistry and biology. In Nigerian schools, science is taught as physics, chemistry and biology. Biology is one of the important science subjects because it is a major science subject that is necessary for future studies in science related disciplines. As one of the core science subjects taught at the senior secondary school level, requires a pass at credit level in order to qualify for admission into tertiary institutions to pursue science based courses (FME, 2008).

Biology education is meant to expose the learners to the nature of the subject (facts, principles and concepts), processes and attitudes and then equip them with skills of a professional biologist. The National Policy on Education (FME, 2008) has outlined the objectives of biology curriculum as: Acquisition of adequate laboratory and field skills in biology, meaningful and relevant knowledge, and ability to apply scientific knowledge to everyday life. According to Idodo (2011), biology is a discipline which focuses itself on the study of life and living organisms, their structure, functions, growth and evolution. In spite of this central and important position of biology among other science related disciplines, Njoku (2005), Okebukola (2009) and Joshua (2012) in their study revealed that academic achievement of students in biology at Senior Secondary School Certificate Examinations (SSCE) has consistently been very poor and unimpressive. The performance of students in science subjects at SSCE has been declining over the years (Ajagun, 2001).

A number of factors have been suggested as contributing factors to the poor performance of students in biology in particular and science in general. Some of these factors include: poor teaching methods and negative attitude of teachers

towards teaching (James, 2005; Aina, 2009&Aderogba, 2012). Other constraints of teaching biology concepts at senior secondary school level as observed by Aina (2009) include the inadequate training of biology teachers as well as over population of students in relation to teacher- pupil's ratio in the schools. Akpoghol (2001) also identified lack of qualified science personnel and equipment, inappropriate medium of instruction, poor classroom management and admission of uninterested students and students' perception of difficulty of science subjects. These ultimately contributed to poor performances on the part of the students.

However, efforts are being made to find solutions to the recurring failure rate among science students (FME, 2008). One of such efforts is on the issue of the use of learner centred instructional methods like activity based method and interactive teaching strategy which has attracted researchers like Lyman (1981), Kagan (2009) and Emman (2014). Danmole and Femi (2004) admitted that no single method is best for the teaching of science especially biology. The researchers agreed that methods that would involve active students' participation such as interactive teaching strategy, cooperative learning, enquiry, guided discovery, project laboratory, field trips/excursion, use of analogy and problem-solving can go a long way to improve learning. However, Igboegwu (2012) described most of the methods used by biology teachers as inappropriate and uninspiring. Bichi (2002), Ajaja (2013) and Abdullahi (2015) noted that the approach to teaching of science subjects has predominantly remained unchanged as teachers persistently use traditional method (lecture) to teach science. Umar (2015) observed that the previous learning methods were not satisfactory as they led to unsatisfactory performance of students in senior



secondary examination. Although Ajaja revealed that the lecture method allows a great deal of information to be passed to learners and favors handling of large classes, as well as covering the stipulated syllabus, such does not stimulate students' innovation, inquiry and scientific attitudes. Therefore, there is the need to search for and incorporate modern instructional strategies like interactive instructional strategy that will add meaningful learning among students.

Interactive teaching is the practice of critical thinking where students are needed to participate in discussion of a discipline, think, speak and be listened to as they participate in the disciplines particularly mode of inquiry, using interactive strategy aids students develop competency and learn better (Kenne, 2005 & Johnson, 2010). This study employed the use of think-pair and share model of interactive teaching strategy, it is a cooperative learning technique created by Lyman (1978), think, Pair and Share is a strategy designed to provide students with "food for thought" on a given topic enabling them to formulate individual ideas and share these ideas with other students (Kenne, 2005). Hence, the activities are learner-centered, democratic and interactive as well as communication skills are enhanced in learning sciences and ecological concepts in particular.

Diane (2007) opined that using think-pair-share strategy entails a teacher posing a question or giving a topic to be discussed rather than relying on the traditional response pattern in which the teacher poses the question and calls on the first student with a hand raised. Think-pair-share first provides "wait time" as the teacher directs students to think of an appropriate response. Diane went further and said that interaction is encouraged as the teacher directs students to pair with a partner and discuss the response each

student has. This paired discussion permits students to articulate their ideas before they share their thoughts with the larger group. Interaction among students play vital role in the life of the individuals, also how person interact with others at home, school, society, among peers and particularly with their teacher in a classroom is also very important (Ibrahim, 2012). Effective use of interactive teaching and the manner in which teachers perform all teaching activities may enhance interest and academic performance among students in the ecological concepts. The philosophy behind interactive teaching is engaging all the students during the learning and arose students' interest as against traditional instruction that engage some and ignore others.

Agarwal (2008) defined interest as a feeling that prompts us to spontaneous activities. It is motivating force that impels us to a personal things or activity as well as effective experience that has been stimulated by the activity itself. Thus, interest can be the cause of activity and the result of participation in activity. Ajewole (2004) on the other hand noted that interest plays a major role in teaching and learning of science subjects, biology inclusive and it affects learning positively. Poor performance may be due to poor teaching methods and these results to negative interest among students. Interesting and well-designed programme can be motivational and students can spend more on tasks, assessment, diagnostics and remediation can be built into programmes to help learners achieve mastery of the concepts taught (Olele, 2008). Also lack of good instructional materials that will stimulate interest of the student and leads to good understanding of the subject are very important (Olorukooba, Lawal & Jiya 2012). Ecology is the concept for the study; ecology is an aspect of Biology curriculum that senior secondary school (SSII) students



offer. Research finding by Oyedokun (2002) have showed that ecology is among other concepts that pose difficulty for students to understand. Its difficulty has resulted in poor academic performance among students (Danmole & Femi, 2004 & Cimer, 2012). Eguabor (2007) observed that ecology covers the largest topics of the entire biology curriculum and is found to be neglected by teachers during the teaching activity.

### **Research Questions**

This study answered the following research questions:

- 1- What is the difference in the mean academic performance of SSII students taught ecology using interactive teaching and those taught same concepts using lecture method?
- 2- Is there any difference in interest in biology among students after exposure to interactive teaching strategy?

### **Null Hypotheses**

This study tested the following null hypotheses at  $p \leq 0.05$  level of significant.

- Ho<sub>1</sub>:** There is no significant difference between the mean academic performance scores of SSII students taught ecology using interactive teaching strategy and those taught using lecture method.
- Ho<sub>2</sub>:** There is no significant difference between the mean interest scores of SSII students taught ecology using interactive teaching strategy and those taught using lecture method.

### **RESEARCH METHODOLOGY**

The design for this study is quasi-experimental control groups used for the study. The study involved four schools

which were randomly selected from the population of schools in Kura Education Zone. The subjects were pre-tested using Ecology Concept Performance Test (EPT) in order to determine the level of equivalence of their academic achievement for the two groups. These four schools were selected, two schools were used as experimental group and two schools were used as control groups. The two instruments designed for the study were validated by three panels of science educators who have experience in test construction in Science Education Department, A.B.U. Zaria and panel of experts in the Department of Educational Psychology, Guidance and Counseling Ahmadu Bello University, Zaria. The reliability coefficient of the ecology concept performance test was found based on the data obtained from the pilot testing and it was  $r = 0.75$ . Treatment were given to the experimental group by exposing the study subjects to interactive teaching strategy for six weeks and control groups were taught ecology concepts using lecture method for six weeks. At the end of eight weeks, post-test were administered to both groups (experimented and control). The scores from the groups were collected and analyzed to determine the differences in the students mean scores using the SPSS statistical package.

### **RESULTS**

**Research Questions 1:** What is the difference in the mean academic performance of SSII students taught ecology using interactive teaching and those taught same concepts using lecture method?

**Null Hypotheses:** There is no significant difference between the mean academic performance scores of SSII students taught ecology using interactive teaching strategy and those taught using lecture method.



The pretest and posttest scores of the two groups of students were compared and used to answer research question one.

Also t-test analysis was employed to answer research hypothesis one. The results are presented in Table 1.

**Table 1:** t-test analysis of the academic performance mean scores of experimental and control groups

Group	N	Mean	Std. Dev	Std. Err	df	t	P-Val	Remark
Experimental	63	51.40	9.81	0.936	121	15.70	0.01	Sig.
Control	60	26.70	5.50	0.936				

Significant at  $P \leq 0.05$

The academic performance means scores of the experimental group is higher than that of the control group. Experimental group means score is 51.40 and control group is 26.70 with a mean difference of 24.70. This means that the experimental group performed better than the control group. The calculated P-value of 0.01 is less than  $P \leq 0.05$ , the level of significance at degree of freedom of 121. Therefore, there is significant difference between the mean academic performance scores of biology students taught using interactive teaching strategy and the mean score of students taught with lecture method. The null hypothesis of no significant difference is therefore rejected. The result thus shows that teaching with interactive teaching strategy improved

students' academic performance in ecology concept taught than lecture method.

**Research Question 2:** Is there any difference in interest in biology among students after exposure to interactive teaching strategy?

**Null Hypothesis 2:** There is no significant difference between the mean interest scores of SSII students taught ecology using interactive teaching strategy and those taught using lecture method.

The mean academic performance scores of the subjects in the experimental and control groups were compared using ANOVA statistics at  $P \leq 0.05$ . The result obtained is presented in Table 2:

**Table 2a:** ANOVA test analysis of mean scores of experimental and control groups on interest in biology before treatment

Group	N	Mean Rank	Std Dev.	Sum of Ranks	F Cal.	P- V	Rem
Experimental	63	33.10	6.64	1787.40	1.05	0.07	NS
Control	60	33.00	6.75	1785.00			

Not Significant at  $P \geq 0.05$

**Table 2b:** ANOVA test analysis of mean scores of experimental and control groups on interest in biology after treatment

Group	N	Mean	Std Dev.	Sum of Ranks	F. Cal	P- Val	Rem
Experimental	63	63.39	4.65	2218.50	5.45	0.01	Sig.
Control	60	33.08	6.56	1786.00			



Significant at  $P \leq 0.05$

The interest in Biology increased among the experimental group of students who were taught using interactive teaching strategy than those taught using lecture method. The mean interest of the experimental group in each of the 35 items is 63.39 which is higher than 33.08 (the mean interest of control group) which has a mean difference of 33.31.

From Tables 2a and 2b, Interest in the experimental and control groups before the treatment shows the  $p$ -value of 0.07 at degree of freedom 121, meaning that there was no significant difference in the mean scores on interest of the two groups. But after the treatment exposure, the  $p$ -value observed was 0.01 at degree of freedom 121. Since the  $p$ -value of 0.01 is less than alpha value of 0.05, a significant difference exists in the mean scores of the subject and this could be attributed to exposure to interactive teaching strategy. The significant difference is in favour of experimental group as revealed in the mean score. A significant difference implies rejection of null hypothesis and retaining alternate hypothesis. Hence, null hypothesis which states there is no significant difference in the interest in biology among students after exposure to interactive teaching strategy and when taught same concept using lecture method is therefore rejected.

## DISCUSSION

This study showed that there is no significant difference between the mean academic performance scores of SSII students taught ecology using interactive teaching strategy and those taught using lecture method.

A significant difference implies rejection of null hypothesis and retaining alternate hypothesis. The significant difference indicates that interactive teaching strategy helped the subjects to

have a higher mean score than the lecture method. The finding is supported by Diane (2007), Kagan (2009), Johnson (2010) and Emman (2014). Diane (2007) whose individual findings revealed that students exposed to interactive teaching strategy performed significantly better than those taught using conventional lecture method. The improvement recorded in the performance of the subject after using interactive teaching strategy could be that the strategy focused on meaningful discussion around text and promotion of the use of comprehension skills, cognitive skill and successful in developing interpersonal skills. In addition, it could be due to the fact that interactive teaching strategy facilitates knowledge in a friendly and efficient way. Johnson (2010) added that interactive teaching strategy helped to improved academic performance of students, stimulated social changes, created conducive learning environment as well as made learning more meaningful and responsive to specific needs of learners. Emman (2014) equally supported this finding expressed that interactive teaching strategy improves students' communication skills of listening and speaking, as well as critical thinking. The study confirms that using interactive teaching strategy is more effective than traditional teaching method in terms' of enhancing students' academic performance. Kagan (2009) also used think-pair-share strategy on students' performance in science subjects. The finding revealed that there is significant difference in the academic performance of students over the students taught using lecture method.

Hypothesis two which states that there is no significant difference between the mean interest scores of SSII students taught ecology using interactive teaching strategy and those taught using lecture





method, there is significant difference in interest ability of subjects in biology concepts due to exposure to interactive teaching strategy and lecture method. The significant difference is in favour of experimental group. This indicates that the use of interactive teaching strategy increased and boosted students' interest towards learning of biology. Increased interest of students towards ecology concepts of biology recorded could be due to change in stimulating effects of use of interactive nature of the strategy, enhancement of conducive learning environment, raising of students' concentration and the general fun experienced during lessons when interactive teaching strategy is used. This conforms to the findings of Enersen (2006) who observed that use of interactive teaching strategy enhanced motivation to learn, raises the level of concentration and also enhanced learning and interest because it is fun and innovative. Furthermore, other reasons that could be behind enhancement of students' interest when taught with interactive teaching strategy is that students were more attentive and engaged in learning, participated more actively in the classroom, and interacted much more with the teacher and their peers.

#### CONCLUSION AND RECOMMENDATIONS

The results of the study have led to the conclusion that there was a significant difference in the mean scores of the performance and interest of the experimental group taught ecology concepts using interactive teaching strategy and control group taught using lecture method. Based on these findings it is recommended that:

- i. Secondary School Education Board should encourage biology teachers to use interactive teaching strategy

as a teaching method in their classrooms.

- ii. Workshops should be organized by Secondary Education Board, STAN, and all Stakeholders of education in order to train teachers on the effective use of interactive teaching strategy.
- iii. Biology teachers should be encouraged to adopt the use of interactive teaching strategy as it improves academic performance and boost the interest of students during the teaching and learning process.

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