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EFFECT OF PEER TUTORING METHOD ON STUDENTS' ACADEMIC PERFORMANCE IN BIOLOGY IN SECONDARY SCHOOL IN RIVERS STATE

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ABSTRACT

This research investigated the effect of peer tutoring method on students' academic performance in biology in AI-emerging society for sustainable development in Rivers State. A quasi - experimental research design was used. The population of the study comprised of 146,125 senior secondary school students of public schools in Rivers State, out of which 116 students were sampled from 6 intact classes in 3 schools (two classes per school). Two objectives, two research questions and two hypotheses guided the study. Biology Performance Test was used as the instrument to collect data for the study. The instrument was validated by two lecturers from the Department of Science Education, Rivers State University, to ascertain the face and content validity. The reliability of the instrument was done using test-retest method, and a coefficient of 0.82 was achieved. The statistical tools used for data analysis were mean and standard deviation to answer the research questions, while z-test was used to test all null hypotheses at 0.05 level of significance. The result from the study revealed that Peer tutoring teaching method was more effective, as students taught with this method performed better than those taught with lecture method. There was no significant difference in the performance of male and female students taught Ecology using Peer tutoring teaching method. It was recommended that Biology teachers should be encouraged to used Peer tutoring method in teaching Ecology.

Key Words: Biology; Ecology; Academic performance; Effect; Teaching Method; Lecture Method

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INTRODUCTION

Biology is one of the science subjects taught in Nigeria senior secondary schools and a compulsory science subject of choice among the students. The word biology is of Greek origin, coined from bios meaning "life' and „logos' meaning the study of life. Biology is conceptualized as a unique life subject, which deals with animate things or organisms, including their structure, function growth, origin, evolution and distribution. Ahmed and Abimbola (2011) opined that, biology is designed ultimately to educate individuals who may or may not pursue biological related careers, but could at least acquire the knowledge as pre-

requisite for pursuing careers in science related disciplines. This includes medicine, nursing, pharmacy, agriculture, genetic engineering among others. According to Aliyu (2014), the popular nature of biology among the science subjects is attributed to it being softer and relatively easier to learn than chemistry or physics.

The objectives of biology curriculum as provided in the National Policy on Education (FRN 2014) are to prepare students to acquire; adequate laboratory and field skills in biology, meaningful and relevant knowledge in biology and also reasonable and functional scientific attitudes among others. According to James, in Danjuma (2017) the objectives of the National Policy on Education will not be achieved as desired, if appropriate teaching techniques and the principle of individual differences which exist among others are not closely monitored. In line with these objectives, the three major science subjects that are taught in senior secondary schools' level in Nigeria are Biology, Chemistry and Physics. Therefore, this study will determine whether Reciprocal Peer tutoring method public. Studies have any positive effect on students performance in Biology.

Academic performance defined by Oludipe and Oludipe (2010) as the exhibition of knowledge attained or skills developed by students in a subject designed by test scores assigned by teachers. Poor performance in Biology has been the major concern of teachers, parents and the entire general public. Studies have shown that students perform poorly in biology. This is because the biology classes are usually too large and heterogeneous in term of ability level. According to Atadoga and Lakpini (2013), the persistent low academic performance in science education is attributed to teacher instructional strategies, attitude, learning style preferred among others. Thus, instructional, strategies used by teacher in teaching-learning process have significant influence on students‟ academic performance. Okebukola (2009) also attributed the poor achievement in Biology to the use of ineffective teaching and learning environment under which Biology teaching takes place. Abdulkarim (2010), opined that apart from the obsolete and inadequacy of equipment and laboratories for teaching biology, some teachers lacked in-depth knowledge of the subject matter and application of inappropriate teaching methods. Therefore, this study hopes to determine whether Peer - Tutoring will have any positive effect on students‟ performance and interest in Ecology concept of Biology.

The study of Ecology today is so important that from primary to tertiary institutions it is considered as crucial to the scientific and technological development of the society. Aliyu (2014) avers that, the understanding of the concepts of Ecology and their mode of operation appears to be more difficult than any other topic in biology this evident is shown in the WAEC and NECO Chief Examiners Reports (2012 – 2017).

The nature of science itself and its teaching methods are among the reasons for difficulties in learning science. Against this background, this study focuses on the effects of Reciprocal Peer-Tutoring on students' academic performance and interest among senior secondary school biology students.

Most teachers adopted conventional method popularly called lecture method which is an oral presentation of ideas, concepts and principles to the students. Usually in teaching with lecture method, the teacher stands in front of the classroom and dictates information relevant to the course content. Lecture Method is less tedious, saves time and provides fascinating and aesthetically stimulating experience especially for new students on topics of interest, Obeka (2009). Similarly, Nworgu (2009) considered lecture method as a one way flow of communication from teacher to the students. It is teacher centered approach because most of

the talking is carried out by the teacher while students remain passive listeners often taking notes. Considering the above scenario lecture method is concerned with how much ground is covered by the teacher before examination. Therefore, most science classrooms today are characterized by lecture method due to the fact that it leads generally to adequate coverage of the syllabus.

According to Nworgu (2009) Lecture method does not take care of individual differences in the students and does not actually involve the students in the active learning process. Hence, it becomes necessary for science teachers to try out other strategies that can allow students to participate actively during lessons. The act of giving help improves learning, and in explaining to other students have the opportunities to engage in knowledge building. Most students do not exhibit these positive helping behaviors and it appears that they must be assisted in order to give and receive beneficial help. Students‟ interaction can be supported through the use of active strategies which are regarded as students centered strategies that provide students with ample opportunity to become actively engaged and help each other to learn.

Peer – Tutoring (PT) is acquisition of knowledge and skill through active helping and supporting among status equals or matched companion (Topping, 2005). Romano and Walker (2010), described peer – tutoring as an instructional strategy where peers act as

“Instructional agents for their fellow students.” In the same view, Adekoya and Olatoye (2011), defined peer – tutoring as an instructional strategy that consists of student partnerships, linking high achieving with low – achieving students or those with comparable achievement for structured reading and study sessions. Also, Nguyen (2013) views peer-tutoring as an instructional method that involves pairing of higher – performing students to tutor lower performing students in a class – wide setting or in a common venue outside the school under the supervision of teacher. Therefore, Peer- tutoring can be defined as the teaching of low – performing students by high – performing students in the class.

Maheady and Gard (2010) reported that peer-tutoring has been commonly implemented in many educational settings across a wide range of ages in a variety of content areas. They added that the strategy does not only have significant improvement on students‟ academic performance but also reduced destructive behavior thereby enhances interpersonal interaction among the students. The use of interest or reward system in biology will encourage students‟ participation and task behavior. During the peer-tutoring sessions, the teacher is expected to supervise all activities and pass out raffle tickets to students exhibiting good tutoring. This can be done to overcome challenges to student’s motivation, teachers also emphasize confidentiality, positive interest and adequate response time when asking questions in peer-tutoring class and this will have significant influence on students‟ academic performance because it encourages students to learn.

Therefore, Peer - Tutoring strategy is the process by which students with guidance from a teacher helps one or more students at the same grade level to learn a skill or concept. It involves students from similar social groups helping each other to learn and learning themselves by so doing (Topping, 2005). Peer - Tutoring can also be defined as a flexible, peer – mediated strategy that involves students serving as academic tutors and tutees; typically, a higher performing student is paired with a lower performing student to review critical academic or behavioral aspects. In the same vein, Peer - Tutoring is a teaching intervention strategy in which students alternate between the role of a tutor and a tutee. Students get to be the teacher and the learner. In this method, two or more students are

grouped together, and it can be used for any subject or age group. Peer - Tutoring allows each student the chance to teach a review lesson, monitor other students in the group and evaluate each other's work through observations or work samples, in this strategy students are huge part of the process. The students can prepare instructional materials as well as receive immediate feedback from their peers. Most Peer - Tutoring Strategy incorporates some kind of rewards for students. Rewards can be given for progress as well as abiding by group rules and procedures (which are enforcing appropriate social skills) for students to feel successful in the groups; they need to be rewarded for more than just academic success. This study will therefore, investigate whether Peer - Tutoring would enhance interest and performance in biology (Ecology) among secondary school students.

Statement of the Problem

Despite the importance of Biology and its impact on the scientific and Technological development of the society, the performance of students in some biology concepts is still not encouraging, for example ecology is one of the important biology concepts taught at secondary schools. The concept enables students to understand and appreciate some of the natural processes within our environment and habitat (where we stay). However, research conducted by Nsofor and Ala (2013) attributed the deterioration in students' performance in ecology to ineffective strategy in teaching the concept. Similarly, WAEC Chief Examiners Report (2011 – 2017) also attributed this poor performance in Biology to low performance in Genetics and Ecology concepts and the situation still persist. Lawal (2009) stated that part of the problems leading to this failure rate in genetics and ecology could include poor method of instruction.

This poor performance of students in biology has continued to be a major cause of concern to all particularly those in the mainstream of biology education in Nigeria. Among other factors that have been identified to be responsible for poor performance in biology are difficulty in the nature of science subjects, (Olorukooba & Muoneme, 2014); poor method of teaching and improper use of materials (Usman, 2010a) and students' lack of interest (Nweke, 2010). The need to find solutions to students' poor academic performance in science subjects and indeed biology is therefore an obvious factor. This situation has created the need for more effective teaching method that will enable the students engage in a peer-interaction to help them improve their performance and have more interest in biology.

Hence, the study investigated the effect of Peer- Tutoring method on students' academic performance in Biology in Port Harcourt Local Government Area, Rivers State. Therefore, the researcher seeks to investigate whether or not Peer - Tutoring method will enhance the students' academic performance in biology in Port Harcourt local government Area, Rivers state.

Purpose of the Study

The Purpose of the study was to examine the effect of peer tutoring method on students' academic performance in biology in AI-emerging society for sustainable development in Rivers State. In order to achieve this aim, the following specific objectives were set out as follows:

1: Determine the difference in the mean performance score of students taught Ecology using Peer - Tutoring Teaching Method and those taught with Lecture method.

2 Ascertain the difference in the mean performance score of male and female students taught Ecology using Peer - Tutoring Teaching Method and those taught with Lecture method.

Research Questions

The study was guided by the following research questions:

1. What is the difference in mean performance score of students taught Ecology using Peer tutoring method and those taught with Lecture method?

2. What is the difference in the mean performance score of male and female students taught Ecology using Peer tutoring teaching method?

Hypotheses

In order to pursue the objective of this study, the following hypotheses were formulated:

1. There is no significant difference in the mean performance score of students taught ecology using Peer tutoring method of teaching and those taught using Lecture method.

2. There is no significant difference between the mean performance score of male and female Students taught ecology using Peer tutoring method and those taught using Lecture method.

Methodology

The design of the study was quasi-experimental design of Pretest Posttest non-randomized group design. The population of the study comprised of 146,125 senior secondary students in all the secondary schools in Rivers State (Rivers State Senior Secondary Schools' Board, PH). The State was stratified into 3 senatorial districts namely; Rivers East, Rivers West, and Rivers South East senatorial districts. Simple random sampling technique was used to select one school from each senatorial district. Two intact classes were randomly chosen in each school selected, and assigned as experimental and control groups. The sample of the study was 116 SS1 students drawn from the 6 intact classes in the 3 schools. Sample comprised of 55 students (26 males and 29 females) for experimental and 61 (26 males and 36 females) for control groups, respectively. A sample size of 116 students is in line with central limit theorem recommendation, which suggested that a minimum of thirty (30) participants can be used to establish a relationship between groups in experimental research as noted by Tuckman, (1975).

SS1 class was purposely chosen because this is where Ecology is listed in their curriculum. Ecology was used as the topic for treatment in both groups. Pretest was administered in both classes before treatment. Peer tutoring method of teaching was used in teaching ecology in the experimental classes, while Lecture method was used in teaching ecology in the control classes. Treatment (teaching) was done for two weeks. The research assistants helped in the teaching of those classes, treatment was done simultaneously in all classes.

Treatment for Experimental Group was done using Peer tutoring technique. This was done by dividing the entire class into groups of five students with different ability levels. Group formation was done by the research assistants (their Biology teacher), who knew their different abilities. The Peer Tutoring format has the following steps:

Content selection (here Ecology was chosen), Tutors Training Programme (the research assistants were given directions on what to do by the researchers), Formation of tutoring groups (done by the research assistants), Tutoring Session (by the research assistants), Monitoring and rounding-up of activities (by the research assistants).

The Tutors were provided with the background rules to observe throughout the tutoring session, this includes: sharing of responsibility, taking turns, using respectful language and accepting criticism in the peer tutoring groups quickly and quietly; peer tutoring practice modeled and students were asked to practice prior to the first peer session and finally students were trained on how to provide feedback for correct and incorrect peer responses, such as praises, clapping, etc.

After treatment, posttest was then administered in all classes/groups.

The instrument was Biology Performance Test (BPT). BPT was a teacher-made test, consisted of two sections. Section A contained personal information like; name of school, school type, gender, group/class, etc; while section B contained 20 objective questions with four options A-D. BPT has a total score of 20 marks, one mark per question.

BPT was validated by two lecturers from the Department of Science Education, Rivers State University, to ascertain the face and content validity.

The reliability of the instrument was done using test-retest method, and a reliability coefficient of 0.82 was achieved.

Results Presentation

Research Question 1: What is the difference in mean score of students taught Ecology using Peer tutoring method and those taught with Lecture method?

Table 1: Mean score of students taught Ecology using Peer tutoring method and those taught with Lecture method.

Groups	**N**	**Pretest**		**Post-test**		**Gain**	**% Gain**
		ẍ	**SD**	ẍ	**SD**		
Experimental Group	55	12.23	4.10	18.34	4.28	6.11	33.30
Control Group	61	11.72	4.02	12.23	4.19	0.51	4.17
Total	**116**						

The table above showed the mean and standard deviation the academic performance of students taught Ecology using Peering tutoring teaching method (experimental) and those taught with Lecture teaching method (control). Pretest and standard deviation of the experimental group was 12.23 and 4.10 respectively. The pretest mean and standard deviation of the control group was 11.72 and 4.02 respectively, while the post-test mean and standard deviation scores of the experimental group (Peering tutoring) is 18.34 and 4.28 respectively. The post-test mean and standard deviation of the control group (Lecture method) was 12.23

and 4.19 respectively. This implied that the students taught with Peering tutoring teaching method performed better than students taught with Lecture method.

Research question 2: What is the difference in the mean score of male and female students taught Ecology using Peer tutoring teaching method?

Table 2: Mean scores of male and female students taught Ecology using Peer tutoring method

Experimental Group	N	Pretest ẍ	SD	Post-test ẍ	SD	Mean gain	Mean gain %
Male	26	22.16	4.70	25.61	5.06	0.36	7.11
Female	29	22.25	4.72	25.72	5.07	0.35	7.9
Total	55						

The table above showed the academic performance of male and female students taught Ecology using Peering tutoring teaching method. Their mean scores showed 25.61 for males and 25.72 for female students respectively. There was a slight difference in academic performance of students exposed to Peering tutoring teaching method on the basis of their gender. The female students were slightly better than their male counterparts. However, the difference is not significant. This implies that the treatment is good for both male and female students as there is no significant difference in the performance of both genders.

Hypothesis 1: There is no significant difference in the Academic performance of students taught ecology using Peer tutoring method of teaching and those taught using Lecture method.

Table 3: z-test for students taught ecology using Peer tutoring (Experimental group) and those taught with Lecture method (Control group).

Groups	N	Mean	SD	Df	z-value Cal	z-value Cri	Decisions
Experimental Group	55	18.34	4.28	114	4.58	1.699	Rejected
Control Group	61	12.23	4.19				
Total	**116**						

P calculated < 0.05 t calculated > 1.699 at df39

The table above shows the null hypothesis 1 that says: There is no significant difference in the Academic performance of students taught ecology using Peer tutoring method of teaching and those taught using Lecture method. This shows that there was no significant difference. This is due to the fact that the calculated p value of 0.04947 is less than 0.05 alpha level of significance and the calculated z value of 4.58 is higher than z critical value of 1.699 at *df* 114. The experimental and control methods have mean values of 18.34and 12.23 which shows that there is a significant difference on the performance of students taught Ecology

with Peering tutoring teaching method and Lecture teaching method . Therefore, the hypothesis was rejected.

Hypothesis 2: There is no significant difference between the academic performance of male and female Students taught ecology using Peer tutoring method.

Table 4 z -test for male and female students using peer tutoring method of teaching

Groups (Experimental)	**Gender**	**N**	**Mean**	**SD**	**Df**	**z_{cal}**	**z_{cri}**	**Decision**
Peer tutoring	Male	26	22.16	4.28				
					53	1.56	1.699	Accepted
Peer tutoring	Female	29	22.25	4.72				
Total		**55**						

This table above shows the null hypothesis that show that there is no significant difference in the performance of male and female students taught Ecology using peer tutoring teaching method. This is due to the fact that the calculated z value of 1.56 is lower than z critical value of 1.699 at df 53. Therefore, the hypothesis was accepted.

Summary of Major Findings

Research question one seek to find out effect of Peer tutoring teaching and Lecture methods of teaching on the performance of biology students in Senior Secondary schools in port Harcourt local government area of Rivers State . It was discovered that students taught using Peer tutoring teaching method had significantly higher academic performance than their counterparts taught using Lecture teaching method. This result agreed with Muhammad (2007) that Peer tutoring teaching method has been describe as problem solving, critical thinking, reflective inquiry, deductive thinking method and not mere personal assumptions as in other testing methods. It is a method of teaching that involves probing, finding out, investigating, analyzing, synthesizing, discovering, evaluating, questioning and thinking.

The study finds out the influence of gender on students' performance in Port Harcourt local government area of Rivers State. The study shows that there is only a slightly different between the male and female students taught using Peer tutoring method of teaching. The study shows that Peer tutoring teaching method is gender friendly and suitable for both male and female students.

Discussion of Findings

The treatment was designed to find out the effect of Peer tutoring teaching method on the performance of male and female students in biology. From the findings, it was discovered that irrespective of the sex of students, Peer tutoring teaching method has positive effect in their biology academic performance. It showed that both male and female students when

exposed to the treatment of Peer tutoring teaching method perform well, implying that both male and female derive almost equal benefit from being taught using the Peer tutoring teaching method.

This outcome agrees with Abu (2000) who reported that there was no significant difference in the performance of male and female students taught using individualized and Peer tutoring methods of teaching. This revealed that Peer tutoring method is gender friendly. Also, Ogu (2010), observed that there was no significant difference in students' mean performance scores according to their gender when they were taught using the Peer tutoring teaching method. Similarly, Odubunmi and Onafowokan (2003) observed no difference in students 'performance based on gender when the subjects were taught using Peer tutoring method of teaching biology.

Summary of Findings

This study was conducted to find out the effect of Peer tutoring method on student academic performance in biology in senior secondary schools in Port Harcourt local government of Rivers state. The findings revealed that:

1. Students taught using Peer tutoring method performed better than those taught with Lecture method.
2. There was no significant difference in the academic performance of male and female students when taught with Peer tutoring teaching method.

Conclusion

Based on the overall findings of the study, the following conclusion can be drawn:

Peer tutoring method of teaching is effective for students, irrespective of gender. Teachers are therefore encouraged to adopt it in science classrooms.

Recommendation

The following Recommendations were made:

i. Teachers are encouraged to teach ecology using Peer tutoring teaching method in order to improve students' academic performance in Biology.
ii. Peer tutoring teaching method should be applied to both male and female students, as the method is not gender sensitive.
iii. Government should sponsor teachers to attend workshops and seminars on the appropriate and effective use of Peer tutoring teaching method in order to improve students' academic performance in Biology.

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