



Effect of Two Modes of Peer Tutoring Strategy on Students Motivation to Study Biology in Secondary Schools in Ogoja Education Zone

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Abstract

This study examined the effect of two modes of peer tutoring strategy on students' motivation to study biology in secondary schools in ogoja education zone. To guide the study, three research questions were posed and three null hypotheses were formulated and tested at 0.05 probability level. Pretest, posttest quasi experimental research design was adopted for the study. The study was carried out in Ogoja Education Zone of Cross River State. The population of the study consisted of 1450 SSII Biology students and a sample size of 78 SSII Biology students was used for the study. This sample was drawn using purposive sampling technique and simple random sampling technique. The instruments used for the study is Biology Motivation Scale (BMS). The instrument was trial tested and a reliability index of .86 was obtained using Cronbach'Alpha Statistics. The research questions were answered using mean and standard deviation, while Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance. The result of the study showed that teaching of biology using class wide peer tutoring proved to be more effective than reciprocal peer tutoring in motivating students to learn biology. The difference was significant. The result of the study showed that the female students had slightly higher motivation in biology than the male students. The difference was not statistically significant. The interaction effect of strategy and gender on the mean motivation scores of students in Biology was not statistically significant. In line with the findings of the study, some recommendations were made among others that seminars and workshops should be organized by the government for teachers on the importance of using class wide peer tutoring instructional strategy. When this is properly done, it will enhance student's motivation to study biology.

Keywords: Peer Tutoring, Strategies, and Students Motivation, Senior Secondary School & Biology

Introduction

Biology is one of the science subjects taught at senior secondary school level in Nigeria. It deals with the study of living things. Taylor, Green and Stout (2004) defined Biology as a subject devoted to the study of the structures, functions evolution, distribution and interrelationships that exist between living things and their environments. The study of Biology offers learners wide range of knowledge about living things and understanding of the Environmental complexities. In Nigeria, for a candidate to enroll for any of these afore-mentioned courses in Institutions of Higher learning, the candidate must possess at least a credit pass (C6) in

senior (High) school certificate examination or its equivalent. Regardless of these relevancies of Biology to humans, reports from researches (Araoye, 2013; Agboghroma&Oyovwi, 2015) and West African Examination Council report (Chief Examiners, 2019 and 2020) indicate persistent students' poor achievement in Biology. Ogundiwin, Asaju, Adegoke and Ojo (2015) attributed students' poor achievement to the use of non-learner-centered method of teaching such as lecture method in delivering biological contents to students. When learners are not actively involved in the learning process, they are disengaged and not motivated to learn.

Motivation as a psychological construct refers to an individual's impulses and motives for action. It is the

force that energizes, directs and sustains individual towards setting and achieving a goal (Godera, Williams & Wright, 2015). It is the force that propels an individual into action to achieve a desired goal. Guerid (2015) see motivation as the desire to engage in an activity out of curiosity, interest and enjoyment. There are two major types of motivation: external or extrinsic motivation and internal or intrinsic motivation. External/extrinsic motivation refers to the tendency to perform external activities for a known external reward such as money, praise or recognition. Extrinsic motivation is influenced by external factors that push an individual to engage in activities without interest but for external reward. Intrinsic /internal motivation on the other hand is self-directed. It is the type of motivation that comes from the pleasure one gets from task that gives satisfaction in completing. Guerid (2015) noted that intrinsic motivation enables students to engage in an activity with a full sense of volition.

In the academic parlance, although intrinsic motivation controls learners' full sense of volition; Yukseloglu and Karaguvan (2013) opined that both intrinsic and extrinsic motivation controls all other factors that affect learning outcomes of students. Hence, both types of motivation are required in promoting students' academic achievement. Mazumber (2014) noted that students with high level of motivation stay focused, overcome academic challenges and achieve highly unlike those with low motivation. Abdurrahman and Garba (2014) identified motivational orientation as an important learners' characteristic variable that influences academic achievement. Hence, promoting students' motivation could enhance academic achievement. To promote students' motivation and enhance their achievement in Biology, there is need for teachers to adopt teaching strategies that could encourage active participation of learners in the classroom.

Researchers such as (Pal, Roy &Gangopadyay, 2014) suggested learner-centered strategies of teaching such as inquiry-based learning, concept mapping, simulation and games and cooperative learning. Peer tutoring can encourage active engagement of learners and could promote students' motivation in the classroom. Hence, this study examined the effects of two modes of peer tutoring considered as learner-centered strategies of teaching and learning by the authors to see what knowledge can be added to

existing knowledge as it relates to child centered learning. Peer tutoring is a type of cooperative learning that encourages learners to work in small groups. It involves brighter learners assisting the less bright ones to acquire knowledge or skills in a tutor/tutee relationship (Horvath, 2011;Yurt&Aktas, 2016).

Peer tutoring encourages learners to help one another to learn by teaching and assisting one another. It involves learners teaching other learners in a tutor and tutee relationship whereby the peer that teaches is the tutor while the peer that is taught is the tutee. Thus, peer tutoring lends credence to the Socio-cultural theory of Vygotsky (1978) which states that knowledge is social in nature whereby the assistance provided by a more academically brighter one(peer), can scaffold other peers beyond their Zone of Proximal Development (ZPD). ZPD is the distance between the actual developmental level as determined by independent problem-solving and the level as determined through problem-solving under adult guidance or in collaboration with more academically brighter peers. The underlying philosophy of Vygotsky's theory is that social interaction provides essential role in the growth and development of cognition in learners as they interact with one another.

Peer tutoring is a teaching strategy worth exploring because it creates favorable social environment that could promote motivation in learners. Quinn (2006) noted that students helping one another to learn in small heterogeneous groups enable them to build a supportive community that raises the performance level of each member. Peer tutoring also encourages, learners' accountability to meaningful knowledge construction (Onwu, 2020). Learners' ability to construct meaningful knowledge may increase their motivation to learn and create greater opportunity for active learners' participation in the learning process. Deci and Ryan (2012) also emphasized that providing learners with the opportunity to participate actively in the learning process enable them to develop intrinsic motivation. Quinn (2006) observed that motivation often correlates with achievement.

Han, Yin and Wang (2015) remarked that motivation correlates with teaching method to promote students' achievement. There are many models of peer tutoring: Cross- Age Peer Tutoring (CAPT); Same- Age Peer Tutoring (SAPT); Reciprocal Peer Tutoring (RPT); Class wide peer tutoring (CWPT) and Peer Assisted

Learning Strategy (PALS) otherwise referred to in this study as Peer Assisted Tutoring (PAT) (Hott, Walker & Sahni, 2012; Ogundola, 2017). This study examined the effects of Two Modes of Peer Tutoring Strategy on Students Motivation to Study Biology in Secondary Schools in Ogoja Education Zone. The choice of these two modes of student-centered learning was based on low motivation to learn science by students as a result of their passive roles in science classrooms; teachers' inability to provide activity oriented and child centered learning which have resulted to poor learning outcomes in Sciences (Biology). The differences in the position of the tutors and tutees during the tutoring sessions differentiates RPT and Class Wide Peer Tutoring (CWPT) modes.

In the Reciprocal Peer Tutoring (RPT) for instance the role of tutor and those of the tutees is occasionally swapped among the group members within a specified time interval. Every member in the group is given the opportunity to act as a tutor and as a tutee within a tutoring session; whereas in the Class wide peer tutoring (CWPT) mode, the peer tutor is fixed throughout the tutoring session. Every member is not given the opportunity to act as a tutor. Only the academically brightest students in the group can act as the peer tutors. The less academically bright students then act as the tutees. In this study we examined how the differences in alternating roles of tutors and that of fixing the roles of tutors within the groups could impact on students' motivation irrespective of their gender.

Gender is a broad analytical concept and socio-cultural attribute assigned to being male and female. It is a concept that is used to draw out women's roles and responsibilities in the society in relation to those of men. It therefore refers to the societal ideas, expectations, norms, economic, social, political, and cultural attributes and opportunities, associated to a male or a female (Erydice, 2010; Family Life Education. In Nigeria, the societal ideas and expectations of the male and female children vary across ethnic groups. Socio-culturally, the male child is viewed as the future bread winner and as such is expected to achieve higher by engaging in task demanding roles more than the girl child. To meet up with the societal expectations, the male child is provided with the opportunity to explore and achieve more than the girl child in stereotypic roles dimensions. These societal misconceptions hitherto

influence learners' abilities in academic activities and tasks especially the sciences (Nzewi, 2010; Anderson, 2017). Girls start to believe gender stereotypes that could hold them back for life by the time they are six years old (Anderson, 2017).

The gender stereotype beliefs are nurtured throughout their schooling years. This provides a chilly psychosocial environment that may hamper their motivation to learn sciences. In view of this, the researchers examined the influence of gender on Biology students' motivation to learn Biology when exposed to treatment conditions. Several factors like; teaching strategies, instructional materials, and school location is attributed to lack of student motivation to study biology. Researchers have proffered solution to this problem by suggesting the use of various innovative instructional strategies, materials and strategies such as constructivist strategy, instructional media, computer-assisted instruction, and computer aided learning. Yet their impacts have not been positively felt in the educational system based on this, therefore, this study seeks to find out if different modes of peer tutoring; Class Wide Peer Tutoring (CWPT) and Reciprocal Peer Tutoring (RPT) could help to enhance academic motivation. The problem of the study is to examine the Effect of Two Modes of Peer Tutoring Strategy on Students Motivation to Study Biology in Secondary Schools in Ogoja Education Zone. Three (3) research questions were answered using mean and standard deviation while their corresponding hypotheses were tested using ANCOVA at 0.05 level of significance.

Research Questions

To guide this study, the following research questions were posed;

1. What are the mean motivation score of students taught biology using class-wide peer tutoring and those taught using reciprocal peer tutoring instructional strategies?
2. What are the mean motivation scores of male and female students in biology?
3. What is the interaction effect of strategy and gender on the mean motivation score of students in biology?

Hypotheses

The following null hypotheses guided the study:

- Ho₁: There is no significant difference on the mean motivation score of students taught biology using class-wide peer tutoring and reciprocal peer tutoring instructional strategies
- Ho₂: There is no significant influence of gender on the mean motivation scores of students in biology.
- Ho₃: There is no significant interaction effect of strategy and gender on the mean motivation scores of students to study biology

Methodology

This study employed a quasi-experimental 2X2 factorial research design. The population of the study consisted of 1450 SSII Biology students and a sample size of 78 SSII Biology students was used for the study because; respiratory system and reproductive system are in their biology curriculum and also have time for the experiment more than SSIII who are busy preparation for their WAEC. This sample was drawn using g purposive sampling technique to select one LGA for the study, simple random sampling technique was used to draw two coeducational schools out of the

9 in the selected LGA, all the biology students in the two coeducational secondary schools constituted the sample. Intact classes were used for both experimental group A and B. Hence they the SS II class have A and B, so it was easy to assign it the two experimental group. The instruments used for the study is Biology Motivation Scale (BMS). The instrument was trial tested and a reliability index of 0.86 was obtained using Cronbach's Alpha. The content validity was established for BMS by face validity by experts in Education Biology. The research questions were answered using mean and standard deviation, while the hypotheses were tested using the Analysis of Covariance (ANCOVA) at an alpha level of 0.05. Effect size (Eta-Squared) was used to determine how important any observed differences are. An effect size of 0.05 and above indicates an important or substantial difference (Cohen, 1988). The extraneous variables were controlled, hence the researcher prepared for, and issued out instructional guides and plans to the teachers in each of the groups to ensure a uniform instructional procedure.

Table 1: Mean (M) and Standard Deviation (SD) motivation scores of students taught Biology using CWT and RPT strategy

Strategy	N	Pretest		N	Posttest		Mean Gain
		\bar{x}	SD		\bar{x}	SD	
CWT	45	40.49	8.39	45	51.69	13.20	11.20
RPT	33	50.67	12.38	33	53.58	11.07	2.91

Table 1. revealed that the pretest motivation mean score for students taught using Class wide Tutoring strategy was (M = 40.49, SD = 8.39) and for the students taught using Reciprocal peer tutoring had (M = 50.67, SD = 12.38) while the posttest motivation mean score for students taught using Class Wide Tutoring strategy was (M = 51.69, SD = 13.20) and mean gain of 11.20 and students taught with

Reciprocal Peer Tutoring was (M = 53.58, SD = 11.07) and mean gain of 2.91. Students taught Biology using Class Wide Tutoring strategy therefore, were more motivated than students taught with Reciprocal Peer Tutoring strategy

The three hypotheses were tested using the Analysis of Covariance. The summary of the analysis for the three null hypotheses were shown in Tables 2.

Table 2: Analysis of Covariance of Students' Biology Motivation Scores by Strategy, and Gender

SOURCES OF VARIATION	SUM OF SQUARE	DF	MEAN SQUARE	F	SIG.	PARTIAL ETA SQUARED
Covariates Pretest Motivation	5105.887	1	5105.887	64.349	.000	
Main Effects (Combined)	756.505	2	378.253	4.767	.011	
Strategy	690.895	1	690.895	8.707	.004	.100
Gender	65.610	1	65.610	.827	.366	.010
2-Way Interactions Strategy X Gender	2.748	1	2.748	.035	.853	.000
Model	5865.140	4	1466.285	18.479	.000	
Residual	5792.347	73	94.778	79.347		
Total	11657.487	77	151.396			

Ho₁: There is no significant effect of class-wide tutoring and reciprocal tutoring on the mean motivation of students' to study biology.

Table 2 showed a statistically significant main effect for strategy $F(1,73) = 8.707$, $p = .004$, partial $\eta^2 = .100$. The null hypothesis, therefore, was rejected, indicating that there was a significant difference in the mean motivation scores of students taught using CWT

strategy and those taught using the RPT. The adjusted mean for CWT strategy was 55.25, while that for the RPT was 48.72. The difference was in favour of the CWT approach.

Therefore, the CWT was superior to the RPT in Biology. The actual difference in mean scores between the groups was not substantial. The effect size, calculated using eta squared, was .100.

Table 3: Mean (M) and Standard Deviation (SD) motivation scores of students according to gender

Gender	N	Pretest		N	Posttest		Mean Gain	
		\bar{x}	SD		\bar{x}	SD	\bar{x}	SD
Male	45	44.98	11.81	45	51.53	12.68	6.55	
Female	33	44.57	11.00	33	53.66	11.90	9.09	

Table 3. showed that the pretest motivation mean score for male students was ($M = 44.98$, $SD = 11.81$) and the female students had ($M = 44.57$, $SD = 11.00$) While the posttest motivation mean score for male students was ($M = 51.53$, $SD = 12.68$) and adjusted mean of 6.55 while the female students was ($M = 53.66$, $SD = 11.90$) and adjusted mean of 9.09. Female students therefore, were more motivated than male students in Biology.

Ho₂: There is no significant influence of gender on the mean motivation of students' to study biology

Table 2 revealed no significant main effect of gender $F(1,73) = .827$, $p = .366$, partial $\eta^2 = .010$. The null hypothesis was not rejected, indicating that there was no significant difference in the mean motivation scores of male and female students in Biology. The eta-squared statistic (.010) indicated a very small effect.

Table 3: Mean (M) and Standard Deviation (SD) motivation scores by Learning Approaches and Gender

Methods	Gender	N	Pretest		Posttest		Mean Gain
			\bar{x}	SD	\bar{x}	SD	
CWT	Male	23	39.43	7.34	23	13.49	50.84
	Female	22	41.59	9.41	22	12.88	52.57
RPT	Male	20	51.35	12.88	20	11.68	53.11
	Female	13	49.62	12.00	13	10.52	54.29

Table 3 revealed an adjusted motivation mean score of 50.84 and SD of 13.49 for male students who were taught with CWT, while their female counterparts had higher adjusted motivation mean score of 52.57 and SD of 12.88. Male students who were taught with RPT had an adjusted motivation mean score of 53.11 and SD of 11.68 while their female counterparts had an adjusted motivation mean score of 54.29 and SD OF 10.52. The results do not suggest the ordinal interaction effect between strategy and gender on students' motivation scores in Biology. This was because, at all levels of gender, the adjusted mean scores were higher for the RPT

Ho₃: There is no significant interaction effect of strategy and gender on the mean motivation of students to study biology.

Table 2 indicated no significant interaction effect of strategy and gender $F(1,73) = .035, p = .853$, partial $\eta^2 = .000$. The null hypothesis was not rejected. The interaction effect of strategy and gender on students' mean motivation scores in Biology was, therefore, not statistically significant. The eta-squared statistic (.000) indicated no effect.

Discussion of Findings

The result of the study showed that Students taught Biology using Class Wide Tutoring strategy were more motivated than students taught with Reciprocal Peer Tutoring strategy. And the difference was significant. This shows that students taught biology using reciprocal peer tutoring were more motivated to study biology than the group taught using class-wide tutoring. The result also showed that the Female students were more motivated than male students in Biology..The results do not suggest the ordinal interaction effect between strategy and gender on students motivation scores in Biology. This was because, at all levels of gender, the adjusted mean scores were higher for the RPT

Conclusions

Based on the findings of the study and the interpretation of results, it is therefore concluded that class wide peer tutoring proved to be more effective in enhancing students' motivation to study biology than reciprocal peer tutoring. The difference in the mean motivation scores of male and female students in biology is not statistically significant.

The interaction effect between peer tutoring strategies and gender on students' mean motivation scores in biology is not statistically significant.

Teaching biology using reciprocal peer tutoring proved to be more effective in motivating students to learn biology.

Recommendations

From the findings of the study, the following recommendations are made:

1. Seminars and workshops should be organized by the government for teachers on the importance of using class wide peer tutoring instructional strategy. When this is properly done, it will improve students' motivation to study biology since the students will be tutored by their peers.
2. Teachers should be trained and retrained on the need to use class wide peer tutoring during classroom instruction. This will make the teachers know the effect of using the strategy in enhancing academic motivation. Also, the strategy when properly planned and adopted by the classroom teacher will aid in saving the teacher's time and reduce stress.
3. Teachers should give adequate attention to both male and female students

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