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ENHANCING STUDENTS' ATTITUDE AND ACHIEVEMENT IN BIOLOGY THROUGH INNOVATIVE STRATEGIES

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Abstract

In this research, the impact of peer tutoring and group tutoring led to team learning approaches on the attitude of the students towards and achievement in biology. The thesis had been motivated by four research questions and six null hypotheses. The research had used quasi experimental method. In particular, the design of the un-equivalent control group. The sample size was 182 SS 1 students from the four sampled government senior high schools in Port-Harcourt metropolis, River State, Nigeria in four intact classrooms. Two of the classes were exposed to peer tutoring while the remaining two were exposed to peer-led team learning strategy. Biology Attitudinal Scale (BAS), and Biology Achievement Test (BAT) were data collection instruments. BAS construct validity was developed using factor analysis, while BAT material validity was calculated using specification table. Reliability for BAS and BAT was obtained using formula 20 (K-R 20) from Cronbach Alpha and Kudar-Richardson. Mean and standard deviation were used to answer the study questions while Covariance analysis (ANCOVA) was used to evaluate the hypotheses at 0.05 significance point. The findings showed that peer-led team learning approach is better than peer tutoring in

enhancing the attitude and achievement of the students in biology. The implications of the findings were highlighted and recommendations made.

Keywords

Attitude, Achievement, Biology, Learning Strategies, Science Education

1. Introduction

Biology knowledge contributes to nation-building, which is why the topic is almost a core topic in senior secondary Nigeria (Hussaini, Foong & Kamar, 2015). But the academic performance of high school students is low (Njoku, 2019). Effective completion of any assignment is accomplishment but academic achievement refers to the progress of a student in achieving short-term (continuous assessment test and semester or term examinations) or long-term (graduation from a program or attainment of a certificate or degree) goals. At the other hand, attitude is how one responds to or reacts to a situation or to someone or something and this can be negative or positive. Achievement could be good or weak, high or low while attitude could be positive or negative (Panganiban, Chavez, Delizo, & Recinto, 2019). Ayuba (2011) pointed out that there is poor scientific achievement (including biology) that could be due to poor educational strategies and insufficient educational materials. Adesoji (2008) discovered that teaching technique or approach can change the attitude of the students toward science. This led the researchers to the application of innovative supplementary learning strategies like peer tutoring (PT) and peer led team learning (PLTL) which could serve for extra lessons that could produce a positive attitude that may likely yield high achievement.

Disparity exists in the way researchers view achievement, teaching / learning strategies, and gender as interactive effects. Nwagbo (2006) found that the teaching method has no interaction effect on achievement, while Omole (2011) found that teaching methods interact with the academic achievement of the students. Nweke, Abonyi, Omebe and Njoku (2014) have observed that relationship between method and gender has no effect on the pupils' achievement in basic science and technology. Additionally, Uroko (2017) and Oludipe (2012) noted that while teaching method has interaction effect on achievement, there was no significant interaction effect on gender.

Gender is masculine or feminine. Gender is described by Iman and Dada (2011) as the social roles, obligations and behaviors produced in our communities, societies and cultures. This is probably why certain hard courses, such as physics, engineering and mathematics, are designated as male courses in the academic sector, while nursing, home economics and the arts are designated by society as female courses (Sofiani, Maulida, Fadhillah, & Sihite, 2017). Sex is one of the major variables of the conduct and academic achievement of the students. Sotonade (2004) went on to say

that in science in general there may be fewer women but not in Biology. Biology seems to be a gender-neutral science throughout the educational system (Usak, Propkop, Ozden, Ozel, Bilen & Erdogan, 2009).

Understanding that biology is gender friendly, coupled with the fact established by Ossioma in Ebuoh (2011), that females perform best in cooperative settings while males do best in individualized settings, the researchers were inspired to look for learner-centered instructional strategies like peer tutoring (PT) and peer-led team learning (PLTL), and find out the effect of such learning strategies on biology students' attitude and academic achievement.

Peer tutoring is an individualized learning strategy in which a student (tutor) with a better understanding of a particular subject gives his / her classmate (tutee) a one-on-one teaching in order to help him / her achieve greater trust, independence and success as a learner (Tella, 2013). This learning technique helps both the teacher and the tutee considerably (Igbo, 2004). Although peer tutoring is a creative, individualized learning method, peer-led team learning (PLTL) is more of a creative science education community learning approach (Cracolice & Deming, 2012). Innovative teaching strategies such as PLTL are solid paradigm shifts towards student-powered or centered learning, where successful students who have recently passed a topic with good grades (A or B) are selected, trained and elevated to coordinate the activities of six to eight students each. Some hypotheses about learning formed the basis for this research.

The learning theories connected to PT and PLTL in this study are Albert Bandura's theory of social learning and Lev Vygotsky's theory of social growth. The theory of social learning by Albert Bandura is focused specifically on the connections involved in learning between individuals. Bandura said observer learning is based on learning by observing, "modeling" or behaving similarly to others, while Vygotsky (1978) asserts three major themes; i) social experience plays fundamental roles in the cognitive development process ii). More Knowledgeable Other (MKO) will improve learning efficiency and iii). The Proximal Development Zone (PDZ), which is the difference between the capacity of the student to carry out a peer-collaborative assignment and the capacity of the student to solve the question independently. Learning happened in this zone according to Vygotsky (1978). Considering the above hypotheses, it is obvious that their peer is one of the most important influences that influence the actions and by extension the students' achievement. This saying is: "Tell me who your friends are and I'm going to tell you who you are" (Njoku, Nwagbo & Ugwuanyi (2020). In most cases this is true because friends have a large influence on friends. Ilhami, Riandi, and Sovia, (2019) expressed the view that teachers can make learning more meaningful if they deliberately consider the experiences of the students in planning how they learn.

This premise informed the decision to try out the learning strategies; peer tutoring (PT) and team learning (PLTL) led by Peer.

Students teaching using PTIM were higher than those educated using an expository form, according to a study by Jibrin and Zayum (2012). In another research by Campit, Cayabyab & Galas (2015), on the effects of peer tutoring approach on student achievement, it was discovered that the students subjected to peer tutoring obtained substantially better outcomes than those subjected to traditional instruction.

Ogundola (2017) once again looked at the impact of the peer tutoring approach on the academic performance of professional drawing (TD) high school graduates. The finding indicated peer tutoring technique was more successful in improving student academic performance than conventional teaching approaches. The research further suggested that class had an effect on the success of TD students in favour of females. The finding also found that treatment and class in TD have little effect on student success in high school. Bramaje & Espinosa (2013) performed a study and noticed that the theoretical comprehension of students trained using PLTL has been improved compared with students subjected to traditional teaching method (TTA). Snyder, Sloane, Dunk & Wiles (2016) reported that constructional learning methods such as Peer-Led Team Teaching (PLTL) were seen as equivalent to traditional lecturing in terms of student achievement. Wells (2012) indicated that peer-led team learning (PLTL) as an instructional tool has created changes in analytical, academic achievement. It provided an insight into the position that PLTL plays in enhancing analytical comprehension of the biology concepts.

The analysis of similar research illustrated results from previous studies on the impact of learning approach on the achievement of science. Furthermore, on PLTL, Chan & Bauer (2015) studied student achievement in general chemistry tests and found no gaps in the achievement of students enrolled in PLTL and those taking part in recorded alternate research activities. Ahmed & Asghar (2011) examined the attitude of students toward biology and its impact on the students' academic achievement. Findings showed no significant difference between girls and boys in attitude toward Biology. The related research report summarized the findings of earlier reports on the effect on academic accomplishment of the learning method.

The following research questions were put to steer the report:

1. What effect do the strategies of Peer Tutoring (PT) and Peer Led Team Learning (PLTL) have on the mean attitude scores of Biology students?
2. What impact does gender have on students' attitude towards Biology?
3. What impact do PT and PLTL strategies have on mean student Biology achievement scores?

4. What effect does gender have on the Biology student's achievement?

The following null hypotheses were checked at 0.05 alpha-level to lead the study:

H01: Mean grades of Biology students subject to Peer Tutoring (PT) and those subject to the coaching methods of Peer Led Team Teaching (PLTL) are not substantially different.

H02: Mean attitudinal ratings of Biology students have no major control on class.

H03: Teaching approaches and ethnicity have no important correlation impact on the mean attitudinal results of students in Biology.

H04: The mean achievement levels of Biology students exposed to PT and those exposed to approaches for PLTL instruction are not substantially different.

H05: The mean achievement scores of Biology students are not substantially affected by class.

H06: There is no major correlation between the learning approaches and class on mean achievement scores of students in biology.

2. Research Method

The study's design is quasi-experimental, particularly the design of the non-equivalent control group. This was used to estimate the causal impact of an intervention, without random assignment, on its target population. Typically, quasi-experimental designs are used when random assignments are not practical or even impossible (Bradley, 2009 & Nworgu, 2016). The sample for the study was represented by one hundred and eighty-two (182) senior secondary (SS1) graduates, consisting of 70 females and 112 males, from four cohesive schools.

Throughout the analysis, a multi-stage sampling technique was used to formulate the sample. Next, it stratified the population into the two Local Government Areas (LGAs). Second, by means of simple random sampling technique, two coeducational schools were selected from each local government district, making a total of four schools. Thirdly, one school was randomly allocated to peer tutoring from each local government district and the other to peer-led team instruction, respectively. By this, each LGA has a group PT and a group PLTL. SSIA which was classified as a science class was used in all the chosen schools.

The researchers developed two instruments for data gathering purposes. The tools are: Biology attitudinal scale (BAS) and Biology attainment test (BAT). Attitudinal Biology Scale (BAS) is composed of two sections (A and B). Section A searched for information on student demographics including name and gender of the school. The instrument's section B includes twenty-five (25) elements designed to assess the mindset of students towards biology. Strongly Agree (SA) = 4 points, Agreement (A) = 3 points, Disagreement (D) = 2 points and Strongly Disagree (SD) = 1

point, Strongly Disagree (SD) = 1 point, for positive statements while the scoring is reversed for negative statements. The students were required to express their attitude towards Biology by ticking (√) in the most appropriate column, against the item stated.

Tests for biological maturity (BAT) have two parts (A and B). Section A requested information on demographic details of the students including the classroom name and gender. Section B looked for information about the Biology student's achievement. This consists of 33 concrete questions from topics in the biology curriculum, selected for the research. The students had to select one of the A to D options, listed against each question. Three experts (two from science education, and one from calculation and evaluation) tested the instrument facially.

"The internal consistency of the instruments was established using data obtained from 30 SS1 students from a comprehensive high school in Ekpetiama, which was not located in the study area. BAS reliability was developed using Cronbach alpha statistics, and was found to be 0.67 while BAT was obtained using Kuder- Richardson (K-R20) and found to be 0.96.

"Before treatment began, researchers prepared lesson notes for the two strategies that were used to train teachers in the class. The class teachers in turn used them to teach PT and PLTL strategies both to the tutor and to the team leader. Students with a stronger understanding of the concepts and higher performance ratings were eligible to be mentor and peer leaders with two strategies, respectively. Both BAS and BAT were administered for the null hypotheses as both pre- and post-test and the scores were collated for statistical analysis, using means and standard deviation for research questions and analysis of covariance (ANCOVA). The theories were checked at a degree of validity of 0.05. Those were all done by a mathematical program array, SPSS 18.0.

3. Results

The findings were described in tables, focused on questions and theories from the study's analysis. Research Question One, which requested knowledge on the impact of strategies to Peer Tutoring (PT) and Peer Led Team Training (PLTL) on mean attitude scores of students in biology, was addressed using data from Table 1.

Table 1: *Mean and Standard Variance of Pupil Disposition Ratings Taught Biology using Peer Tutoring and those Learned Utilizing Peer-Led team Learning Approaches*

Treatment	N	Pre-test		Post-test		Mean Gain Score
		Mean	SD	Mean	SD	
Peer Tutoring	92	51.74	5.96	58.01	7.93	6.27
Peer Led Team Learning	90	51.56	6.04	64.91	13.62	13.35

This table 1 indicates that students subjected to peer tutoring in biological learning had a mean attitudinal score of 51.74 with a standard deviation of 5.96 and a mean attitudinal score of 58.01 with a standard deviation of 7.93, while those subjected to peer driven team learning in Biological learning had a mean attitudinal score of 51.56 with a standard d Mean benefit of 6.27 and 13.35 respectively. The post-test standard deviations of 7.93 and 13.62 between the two groups of students respectively indicate that the difference in the individual grades of students subject to peer-guided team instruction is larger than those subject to peer-guided tutoring.

Research question two: Sought information on the influence of gender on students' attitude towards Biology.

Table 2: Mean and Standard Deviation of Attitudinal Scores of Male and Female Students towards Biology

Gender	N	Pre-test		Post-test		Mean Gain Score
		Mean	SD	Mean	SD	
Male	112	51.40	5.88	60.71	11.01	9.31
Female	70	52.04	6.18	61.87	12.56	9.83

Results from Table 2 reveal that male students had a mean pre-test attitudinal score of 51.40 with a standard deviation of 5.88 and a mean post-test attitudinal score of 60.71 with a standard deviation of 11.01 while female students had a mean attitudinal pre-test score of 52.04 with a standard deviation of 6.18 and a mean post-test attitudinal score of 61.87 with a standard deviation of 12.56. Mean benefit scores of 9.31 and 9.83 for male and female students, respectively, suggest higher mean post-test attitudinal performance for female students than male students. Nonetheless, the post-test standard deviations of 11.01 and 12.56 for male and female students, respectively, show that the difference in female students' individual grades is larger than male students'.

Research Question Three: on the Students' impact of PT and PLTL strategies

Mean Biology achievement scores were answered using Table 3 data.

Table 3: Mean and Standard Deviation of Achievement Scores of Students taught Biology using Peer Tutoring and those Taught using Peer Led Team Learning Strategies

Methods	N	Pre-test		Post-test		Mean Gain Score
		Mean	SD	Mean	SD	
Peer Tutoring	92	11.40	2.87	15.07	3.88	3.67
Peer Led Team Learning	90	11.79	2.58	17.54	4.53	5.75

Table 3 results indicate that students exposed to peer tutoring in biology learning had an average pre-test achievement score of 11.40 with a standard deviation of 2.87 and a mean post-test

achievement score of 15.07 with a standard deviation of 3.88 while those exposed to peer guided biology learning had an average pre-test achievement score of 11.79 with a normal Median gain score of 3.67 and 5.75 for both.

For the two group of students, post-test standard deviations of 3.88 and 4.53 suggest that the variance in the individual grades of students subjected to peer guided team learning is greater than those subject to peer tutoring.

Research question four that sought information about the influence of gender on the achievement of students in Biology was answered using data from table 3.

Table 4: *Mean and Standard Deviation of Achievement Scores of Male and Female Students towards Biology*

Gender	N	Pre-test		Post-test		Mean Gain Score
		Mean	SD	Mean	SD	
Male	112	11.48	2.81	16.09	4.33	4.61
Female	70	11.77	2.61	16.61	4.48	4.84

Table 4 data indicates that male students had a mean performance score of 11.48 with a standard deviation of 2.81 and a mean performance score of 16.09 with a standard deviation of 4.33, while female students had a mean performance score of 11.77 with a standard deviation of 2.61 and a mean performance score of 16.61 with a standard deviation of 4.48, respectively. For the male and female students, mean gain scores of 4.61 and 4.84 indicate that the female students had a higher mean achievement score than the male students after the test. However, the post-test standard deviations of 4.33 and 4.48 for male and female students suggest that the difference in the female students' individual grades is greater than the male students'."

H₀₁: The mean attitudinal grades of Biology students subject to Peer Tutoring (PT) and those subject to Peer Guided Team Learning (PLTL) learning approaches

Table 5: *Analysis of Covariance of the Effect of Peer Tutoring and Peer Led Team Learning on Students' Attitudes towards Biology*

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Strategy	2622.183 ^a	4	655.546	5.329	.000	.107
Intercept	6760.756	1	6760.756	54.957	.000	.237
Pre-attitude	146.974	1	146.974	1.195	.276	.100
Treatment	2431.352	1	2431.352	19.764	.000	.446
Gender	279.676	1	279.676	2.273	.133	.013
Treatment * Gender	67.411	1	67.411	.548	.460	.003

Error	21774.240	177	123.018			
Total	711045.000	182				
Corrected Total	24396.423	181				

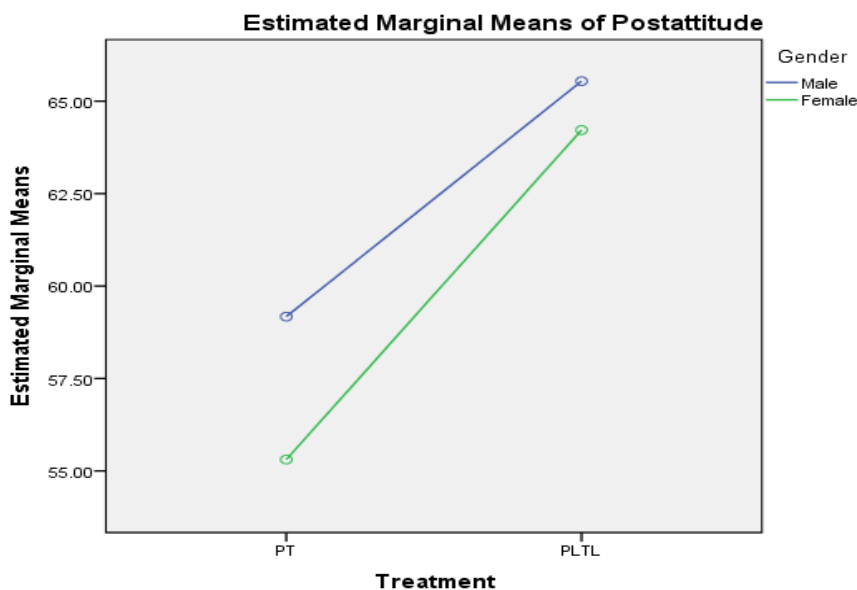
Data from Table 5 reveal that the likelihood associated with the estimated value of F (19.764) for the influence of peer tutoring and peer guided team learning on biological attitudes among students is 0.000. While the 0.000 probability value is lower than the 0.05 significance point, it dismissed the null hypothesis. This means that the mean attitudinal grades of Biology students subject to Peer Tutoring (PT) and those subject to Peer Led Team Teaching (PLTL) approaches are slightly different in favour of those exposed to PLTL

H₀₂: Mean attitudinal ratings of Biology students do not have any major gender impact.

The data in Table 5 show that the probability correlated with the estimated value of F (2.273) for gender influence on the attitudes of the students towards biology is 0.133. Although the chance value of 0.133 is greater than the significance level of 0.05, the null hypothesis has not been dismissed, which means that there is no important gender impact on the students' mean attitudinal against biology results. H₀₃: There is no significant interaction effect of learning strategies and gender on the Biology students' means attitude scores.

Table 5 data indicates that the probability of the correlation effect of learning strategies and gender on the attitudes of students towards biology correlates with the approximate significance of F (.548) is 0.460, which is greater than the sense level of 0.05 , the null hypothesis was acknowledged.

This means that learning strategies and race have no major interaction effect on the mean disposition outcomes of Biology students. However, the Partial Eta Square's 0.003 value (effect size) indicates that learning approaches and gender do not dramatically interfere to influence the students' attitude score in biology."



Covariates appearing in the model are evaluated at the following values: Preattitude = 51.6484

Figure 1: Graph of the Interaction Effect of Learning Strategies and Gender on Students' Attitudes towards Biology

Figure 1 shows that there is no interaction effect of learning strategies and gender on students' attitudes towards Biology. This is indicated by the separate lines for the male and female students' attitudes towards Biology in the respective instructional methods.

H₀₄: There is no significant difference in the mean achievement scores of Biology students exposed to PT and those exposed to PLTL learning strategies.

Table 6: Analysis of Covariance of the Effect of Peer Tutoring and Peer Led Team Learning on Students' Achievement in Biology

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Strategy	992.579 ^a	4	248.145	17.661	.000	.285
Intercept	574.555	1	574.555	40.891	.000	.188
Pre-test	712.180	1	712.180	50.686	.000	.285
Treatment	208.306	1	208.306	14.825	.000	.573
Gender	.225	1	.225	.016	.899	.000
Treatment * Gender	.729	1	.729	.052	.820	.000
Error	2486.987	177	14.051			
Total	51783.000	182				
Corrected Total	3479.566	181				

Table 6 data shows that there is 0.000 likelihood compared with the predicted value of F (14.825) for the impact of peer tutoring and peer-led team learning on Biology students'

achievement. Although the likelihood figure of 0.000 is smaller than the point of importance of 0.05, the null hypothesis has been discarded. This means that the mean achievement levels of students in Biology subject to Peer Tutoring (PT) and those subject to approaches for Peer Led Team Training (PLTL) are slightly higher for those exposed to PLTL. H05: Mean Biology student achievement scores are not greatly affected by class.

Table 6 reveals that the chance of estimated value of F (.016) for gender impact on student achievement in Biology is 0.899.

While the likelihood value of 0.899 is greater than the significance point of 0.05, the null hypothesis was not discounted and means that there is no substantial gender impact on mean student achievement scores in Biology. "H06: There is no major association impact between learning approaches and gender on mean student achievement scores in Biology.

Table 6 indicates that the likelihood of F (.052) estimated significance for the association impact of learning approaches and gender on student achievement in biology is 0.820, indicating that the null hypothesis was embraced.

It means that the learning approaches and class had no major impact effects on the mean biological student achievement ratings.

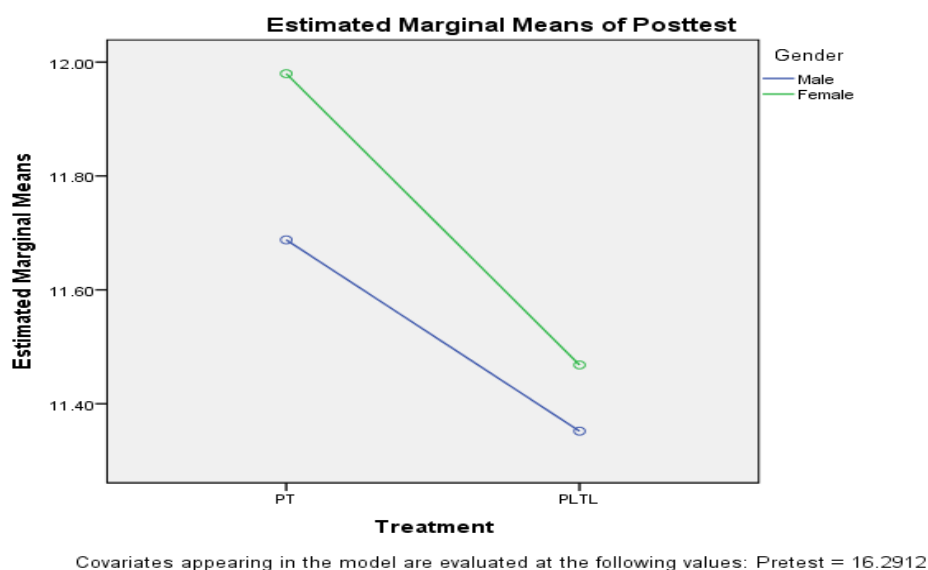


Figure 2: Graph of the Interaction Effect of Learning Strategies and Gender on Students' Achievement in Biology

Figure 2 show that learning strategies and gender have no interaction effect on the achievement of the students in Biology. This is indicated by the separate lines in the respective instructional methods for the achievement of male and female students in Biology.

4. A Summary of the Results

- The mean attitudinal grades among Biology students subject to Peer Tutoring (PT) and Peer Guided Team Learning (PLTL) approaches among those subjected to PLTL are substantially varying.
- The mean attitudinal score in Biology is not significantly influenced by gender.
- The mean success levSels of Biology students subjected to Peer Tutoring and Peer Driven Team Learning approaches are substantially different.
- There is no major gender impact on the mean Biology students' level of achievement.
- Learning strategies and gender have no significant interaction effect on the mean attitudinal score of students in Biology.
- The learning strategies and genders have no significant interaction effect on Mean achievement scores for students in Biology.

5. Discussion of Findings

Peer Led Team Learning strategy seems to have eased a positive attitude towards Biology among students. Further study as seen in table 5 reveals that the discrepancy in the mean attitudinal scores of the two groups was important, leading to the dismissal of the null hypothesis (H_{01}), which states that there is no substantial gap in the mean attitudinal scores of revealed PT and PLTL approaches of the Biology students. This result is consistent with that of Bramaje and Espinosa (2013), which suggested that the approach of Peer Led Group Training changed the attitude towards Chemistry positively. Conversely, the results of this research did not align with Tella (2013) who demonstrated that peer tutoring approach had a huge influence on the attitude of students towards mathematics. This difference in the substantial impact of learning approaches (PT and PLTL) on the attitude of students towards biology can be attributed to the nature of the subjects and the student level (secondary and primary).

Peer led team learning could have produced a more positive attitude than peer tutoring because each group consisted of six or seven students who learned how to relate within a few weeks of interaction and developed the right attitude towards biology. This finding is in keeping with Adesoji (2008), who came up with the fact that teaching strategy or method can change the attitude of the students towards science. The reason PLTL appears to be producing a positive attitude towards Biology may also be because it is a special group strategy in which students interact with each other, feel free to ask questions with a more knowledgeable peer, presented by Vygotsky (1978) as a "More Knowledgeable Other" (MKO), very handy to lead. The involvement of a teacher

who might only be there as a reference or facilitator does not endanger the students.

As far as the influence of gender on the attitude of students towards biology is concerned, statistical analysis on table 5 indicates that gender has no significant influence on attitudinal scores of students in biology. The null hypothesis (H_{02}), which states that there is no significant gender influence on mean Biology student attitudinal scores taught using the two strategies (PT and PTTL), was not rejected. This finding is in line with Ahmed and Asghar (2011), who found that there was no significant difference in attitude towards Biology between girls and boys. The findings from this research further corroborate the results of Hassaini, Foong and Kamar (2015), that there were no major variations in perceptions between male and female students. Sofiani, Manlida, Fedhilah, and Sihite (2017) have suggested that the mindset of male and female students is not substantially different. This means that attitude towards science (Biology) does not inherently affect gender. On the other hand, the result of this study disagrees with Chan and Bauer (2015) who found that males have a higher positive attitude than their female counterparts when science students were exposed to the PLTL. This disparity may have been because Chan and Bauer worked in a post-secondary school for Chemistry, while the present study employed high school Biology students. The students' degree and research course may have been responsible for the disparity in attitude between the sexes.

The outcome from Table 6 on the effect of PT and PLTL approaches on the mean achievement scores of students in biology indicated that peer-led team learning approach has a substantial impact on the achievement of students in biology. The null hypothesis (H_{01}) which states that the mean achievement scores of Biology students exposed to peer tutoring and peer-led team learning strategies are not significantly different is rejected. The findings of this study are in line with the findings of Bramaje and Espinosa (2013), who discovered that enhanced conceptual understanding of science students exposed to peer led team learning. Wells (2012) has advocated the use of peer driven team collaboration approach as a high school biology teaching technique. Wells promoted the use of PLTL in high schools, as it plays a critical role in enhancing the comprehension of biology principles by the students. This suggests that PLTL can be used effectively to improve understanding of basic concepts in Biology, thus laying a solid foundation for future pursuits of biology education. This observation is also in line with Snyder, Sloane, Dunk and Wiles (2016), who reported a dramatic reduction in the large disparity between under-represented minority (URM) students and non-URM students after both classes were subjected to peer-led team instruction. This implies PLTL will cross the distance between students who are weak and solid. However, this finding disagrees with Jibrin and Zayun (2012) who discovered that the student

exposed to the Peer Tutoring Instructional Method (PTIM) performed better than the students exposed to the Expository Method. Again, this research finding disagrees with Uroko (2017) who discovered that the strategy of reciprocal peer tutoring (RPT) significantly improved student achievement in mathematics. Uroko's finding disagrees with Chan and Bauer (2015) who found out that participants in the PLTL were showing stronger achievement in the examination. The disparity expressed above may be due to the fact that the studies were conducted in a post-secondary setting, and in various subjects (mathematics and chemistry) rather than biology.

As for the influence of gender on student achievement in biology, the outcome in table 6 showed that gender had no substantial impact on student achievement scores in biology; although outcomes in table 4 reported that female students had a higher mean achievement score than male students after review. There is no criticism of the null hypothesis (H_{05}) that states that there is no major gender impact on Biology students' achievement. This means that class in Biology will not affect graduate progress. Furthermore, the significance of Partial Eta Square (effect size) shows that gender has no major influence on the students' achievement scores in Biology. This result is consistent with Uroko (2017) and Oludipe (2012) who claim there are gaps in class in the students' achievement in science. At the other hand, the result of this research would not align with the submission by Ahmed and Asghar (2011) who found that in Biology, female students achieved higher levels than their male counterparts. From the present study, we can deduce that gender has no significant effect on students' achievement in biology. Any disparity found in Biology attainment between male and female students may have been due to mistake.

The findings obtained in Table 5 shows that there is no major interaction impact of learning strategies and gender on mean attitudinal scores of students in biology, for the interaction effect of learning strategy and gender on the attitude score of students in biology. The null hypothesis (H_{03}) of no meaningful impact in biology on mean attitudinal scores between learning technique and gender is not dismissed. In Figure 1 the relationship is further illustrated by different lines on a graph showing the attitudes towards biology of the male and female students in the respective teaching methods. The result confirms Tella (2013) who said that between students there is no substantial association between learning approaches, gender and attitude towards biology.

In comparison, the interaction impact of learning strategies and gender on mean Biology student achievement scores suggests that learning strategies and gender have no major interaction effect on mean Biology students' achievement scores. Results from Table 6 indicate that the null hypothesis (H_{06}) was not discarded. Figure 2 provides a summary of the relationship between learning strategies (PT and PLTL), school, and student achievement in biology. The straight line graph

showed no meeting point for all factors, explicitly showing that learning methods and class had little impact influence on student achievement in Biology. This finding coincides with that of Tella (2013); Nweke, Abonyi, Omebe and Njoku (2014), who discovered that methods and curriculum have little impact on the students' achievement in science topics.

6. Conclusions

The report drafted the following conclusions:

- Using peer-led team learning strategy in learning Biology concepts leads students to a positive attitude towards Biology more than when using peer tutoring strategy.
- Gender is not a critical factor impacting the mindset of students towards Biology despite having been subjected to peer tutoring and peer-led team learning strategies.
- Using peer driven team coaching approach substantially improved the achievement of students rather than using peer tutoring learning approaches.
- When students learn with peer tutoring and peer-led team learning strategies, gender is not a significant factor influencing the achievement of students in biology.
- The relationship of learning approach and gender did not influence the attitude of the students towards biology.
- No major correlation between learning approach and gender has been seen on the achievement of students in biology

By providing empirical evidence for the use of peer tutoring and peer-led team learning strategies in Biology learning, this research contributes to academic knowledge. The findings have consequences for teachers, students and curriculum designers in Biology.

The peer-led team learning approach could boost the attitude and achievement of the students in Biology for biology teachers. This learning strategy incorporates different approaches that could encourage students of different backgrounds and gender to effectively learn Biology.

In a better learning environment, the student would have a better and more innovative way of learning as they interact freely with their peers, thus developing a positive attitude towards biology.

To curriculum designers, the result means that Biology Curriculum Development Plans need to be closely re-evaluated and insure the implementation of events and promote the use of peer-led team collaboration approach to achieve a stronger future to Biology Education and the country as a whole.

It is recommended to: based on the above implications:

- Teachers in biology should follow peer-led learning approach because it will improve the overall mindset and accomplishment in biology as well as lead to reducing the gender disparity that can exist in biology.
- Daily awareness workshops should be arranged by the government, through the Post-Primary Schools Board (PPSB) and the Science Teachers' Association of Nigeria (STAN), to retrain biology teachers on the production and use of Peer Driven Team Learning for teaching.
- Staff educators will integrate Peer Led Group Training as a method for pre-service classroom instruction.

Finally, this subject should be researched in tertiary institutions in Nigeria rather than in the secondary schools.

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