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PEER LED TEAM LEARNING AND SECONDARY SCHOOL STUDENTS ACADEMIC PERFORMANCE IN ARITHMETIC PROGRESSION IN UYO LOCAL GOVERNMENT AREA OF AKWA IBOM STATE, NIGERIA

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ABSTRACT: *This study sought to determine the influence of peer led team learning of secondary school students' academic performance in arithmetic progression in mathematics. Two each of purpose of study, research questions and hypotheses were formulated to guide the investigation. Quasi-experimental research design was adopted for the study. The population of the study was all SS2 students in pubic secondary schools in Uyo Local Government Area of Akwa Ibom State, Nigeria numbering 5768. The sample was made up of 400 SS2 students selected from two secondary schools in the Local Government Area. Data for the study were gathered using a researcher made "Mathematics Achievement Test in Arithmetic Progression" (MATAP). The reliability of the instrument was determined using split half method, which yielded a coefficient of 0.78. The findings of the study revealed that students taught arithmetic progression using peer led team learning method performed better than students taught using lecture method. The result also indicated that male and female students taught arithmetic progression using peer led team learning do not differ significantly in their academic performance. It was recommended among others that teachers should use peer led team learning in the teaching of Arithmetic Progression.*

KEYWORDS: Learning, Students, Academic Performance, Arithmetic Progression

INTRODUCTION

Background of the Study

Mathematics plays a fundamental role in the scientific and technological progress of any nation, Nigeria not being an exception. Consequently, mathematics is taught at all levels of education. Greater demand for economic, scientific, and technological knowledge in the Nigeria development programmed has brought about the need for securing of an excellent mathematical knowledge at all levels of education. Thus, increasing knowledge in mathematics of the future engineers, physicists, chemists, sociologists, industrial and medical personnel's, as well as other professionals, including historians should be accorded priority now.

Nigeria and the world all over are talking about sustainable development, in which STEM (science, technology, engineering, and mathematics) cannot be set aside, nor separated from the plans to achieve the needed sustainable development. According to Nwafor (2012), sustainable development is a process, in which the people or the beneficiaries are actively involved in deciding what they need and how to provide for them.

In order for the people to participate meaningfully, there is a need to equip them with necessary lifelong or process skills, such as communication, collaboration or team skills, tolerance, decision-making skills, information-searching and utilization skills, thinking skills,

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and leadership skills (Nwafor, 2012) The whole body of knowledge in mathematics is a process which involves some of the enumerated skills. So, we must find a way to teach mathematics such that students are not just beneficiaries, but also as partakers in deciding the course of development. This can only be achieved which students are given the opportunity to participate in their own learning through the use of appropriate teaching method, such as peer led team learning, (PLTL).

Peer learning is essentially peers teaching each other and gaining an enriching learning experience through that. PLTL further emphasizes the importance of peers leading sessions in order to facilitate small group conversations on the current topic of study. Through the implementation of PLTL, the hope is that students would increase their conceptual understanding as evidenced through a written assessment.

Peer Led Team Teaching incorporates three aspects: (a) discussing (b) questioning, and (c) applying (Quitadamo, Brolerer and Croach; 2009), all of which are done collaboratively in small groups. Developing a greater understanding of PLTL requires expanding on these three aspects.

Gaining knowledge through discussions is different than attempting to construct knowledge through listening to someone. Discussions require the active participation of more than one party; discussing information involves thinking, questioning, and learning on a level that is not possible through just listening to someone talk. Shared experiences generate ideas and growth only possible through interaction with others (Vygotsky, 1978). Implementing learning strategies such as PL TL allows students to discuss a topic of study, thus actively engaging the learner. McCrone's study (as cited in Weber, Maher, Powell, & Stohl, 2008, P. 247) stated, "discussions allow students to test ideas, to hear and incorporate the ideas of others, to consolidate their thinking by putting their ideas into words, and hence, to build a deeper understanding of key concepts". When students share ideas with each other, cognitive growth occurs as a result of discussions on topics at a deeper level. Thus, discussion is an important component of PLTL, giving students the opportunity to bring forth ideas they may not have thought about until given the chance to communicate in small groups (Tien Roth and Kampmier 2002). Conceptual understanding developed as a result of using prior knowledge, sharing that knowledge, and in return gaining new knowledge through small group discussions. Students often gain a superficial understanding of content through listening to lectures. However, when learners become active participants in what they are learning, enriched meaning and understanding may result. Learners may also learn to think in a different way and in turn share knowledge in different ways with others.

Questioning is an important developmental aspect that allows learners to ask questions in order to further understanding as a part of discussing. As students generate meaningful discussions, questioning should become a natural part of that process. Questioning involves examining what was learned from an inquisitive angle. Students are able to question the meaning of what is learned, its significance, and how to apply what is learned outside the classroom. Findings from Rennie, Goodrum, and Hackling (2001) suggests that the ideal science education should promote scientific literacy through allowing students to question and investigate scientific matters. Deep understanding and application abilities develop when students are willing to take risks to ask meaningful questions to better grasp what is being taught. Furthermore Hodson (2003, p. 213) suggests that developing an understanding of the ideas and concepts of science means that pupils spend more time interacting with ideas". Interacting with ideas implies thinking more about what is being presented and as a result

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asking questions about what is being presented. As a part of PLTL, student take the information presented and question what is being taught to gain insight and develop conceptual understanding.

One of the aims of PLTL is to develop students' abilities to ask meaningful questions leading to deeper levels of understanding (Weber et al., 2008). As such, students should be "actively engaged in their own learning by having them find answers to questions and teach those answers instead of simply copying notes from a lecture" (Tessier, 2007, p. 68). Collaboratively asking questions and finding solutions allow for shared cognitive development, as the learners become primarily responsible for the own understanding of concepts and how to apply their understanding.

In addition to discussing and questioning, applying what has been learned is an equally important part of PLTL. Applying knowledge engages students on another level and is a means of helping them to discover personal relevancy or meaning from what is being taught (Castano, 2008). Connecting the abstract with something that is relevant may provide insight into a topic which may have seemed insignificant before.

In regards to scientific content, some topics can be abstract and difficult to grasp. Consequently, students may not be grasping information if they are simply copying scientific theory from a blackboard.

Hodson (2003, p. 654) states, "providing content in socially and personally relevant context… can provide the motivation that is absent from current abstract, de-contextualized approaches and can form a base for students to construct understanding that is personally relevant, meaningful, and important". This requires that learning continue to move beyond the nonreciprocal method of teaching, since it is not the most effective method to induce understanding (Ramaswamy, Hurris and Tschimer 2001). Implementing strategies which develop collective thinking and making connections result in meaningful learning.

Castano (2008, p. 583) clearly articulates that connection of scientific concepts with the day to day life… has a positive impact in the understanding of scientific concepts. This impact to be further enhanced in an environment where students have the opportunity to discuss where the application of science implies making decisions that affect people and other living organisms.

Helping students to see the applications of science beyond the classroom plays an integral role in developing a deeper, more meaningful understanding of science and how it affects them and the world around them. Encouraging students to think of relevant applications beyond the scope of learning presented may enhance their conceptual understanding of scientific concepts.

Statement of the Problem

Mathematics as a subject affects all aspects of human life at different levels. Mathematics is seen by society as the foundation of scientific and technological knowledge that is vital in socio-economic development of a Nation. It is in realization of the vast applications of Mathematics that made Eraikhuemen (2003) to posit that a disciplined and ordered pattern of life can only be achieved through the culture of Mathematics. Unfortunately, students' achievement in this important subject over the years has not been encouraging at the primary, secondary and tertiary levels of education in Nigeria. Many students today have developed a

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negative perception of mathematics as a difficult and uninteresting subject especially in Arithmetic progression. As a mathematics teacher, the researcher came to this position as a result of conversation with other mathematics teachers in the zone during different fura. This made the researcher to wonder, could the poor performance of students in mathematics be as a result of the teaching method used by teachers? Could peer led team learning help to improve students' performance in mathematics? To find satisfying answers to these questions, the researcher was motivated to conduct this study on the influence of peer led team learning on students' academic performance in Mathematics.

Purpose of the Study

The main purpose of this study is to determine how peer led team learning influence students' academic performance in Arithmetic Regression in secondary schools in Uyo Local Government Area.

Specifically, the study sought to determine;

i. Whether students taught Arithmetic Regression using peer led team learning and those taught using lecture method differ in their academic performance in secondary schools in Uyo local Government Area.

ii. Whether male and female student taught Arithmetic Regression using per led team learning differ in their performance in secondary schools in Uyo Local Government Area.

Research Questions

The following research questions were raised to guide the study.

i. Do students taught Arithmetic progression using peer led team learning and those taught using lecture method differ in their academic performance?

ii. Do male and female students taught Arithmetic progression using peer led team learning differ in their academic performances?

Null Hypotheses

The following null hypotheses were tested:

i. There is no significant difference in the academic performance of students taught Arithmetic progression using peer led team learning and those taught using lecture method in Uyo Local Government Area.

ii. There is no significant difference in the academic performance of male and female students taught Arithmetic progression using peer lead team learning in Uyo Local Government.

Method

The study employed a quasi-experimental research design. Specifically the study employed a non-equivalent pre-test post-test design. Quasi-experimental research design shares similarities with the traditional experimental design or except that it lack the element of random assignment to treatment or control. The researcher used quasi experimental because

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intact classes were used. The treatment groups and the control group were given pre-test before treatment and a post-test after treatment. The design can be used in a school without any disruption to a school class structure and timetable of academic events.

The structural representation of the design is as shown below:

O_1 X O_2

O_3 C O_4

Where O_1 and O_3 are pre-tests and O_2 and O_4 are post-tests

X = treatment and

C = control

The pre-test was used to establish equality or no difference between the treatment groups and determine their level of achievement in Arithmetic Progression before the treatment. The study was conducted in Uyo Local Government Area of Akwa Ibom State, Nigeria.

The population for this study was made up of all Senior Secondary Two (SS2) students in public secondary schools in Uyo Local government Area. According to the Akwa Ibom State Secondary Education Board, a total of 14 public secondary schools in Uyo Local Government Area and a total of 5768 SS2 students were in the area.

The sample for this study was made up of 400 SS2 students selected from four public secondary schools out of the 14 public secondary schools in Uyo Local Government Area. Using purposive sampling method, intact class of 50 students were chosen for the study. The number of students in the experiment and control groups were 200 each. They were four experiment and four control classes. Each experiment group (class) was divided in five sub-groups for effective application of PLTL.

The instrument for the study was a researcher made "Mathematics Achievement Test in Arithmetic Progression" (MATAP). The instrument was made up of 20 items on arithmetic progression. The questions were multiple choice questions, each with four options lettered A-D. Among the four options, and there is only one correct option and the other three were distracters. Each of the correct option carried a score of five while the distracter carried a score of zero since the result was expressed in percentage.

The instrument was validated by three experts, two mathematics teachers in secondary schools and a test and measurement expert from Department of Educational Foundations, Guidance and counselling, University of Uyo, Nigeria. From their feedback, two items were amended. To establish the internal consistency of the instrument, the instrument was administered to 30 SS2 students in Uyo Local Government Area who were not part of the study. The reliability coefficient of the instrument was determined using split-half, which yielded a coefficient of 0.79. According to Nachmias and Nachmias (2009) positive coefficient of over 0.7 is considered to be reliable, and the higher the coefficient the more reliable the instruments. Thus, the instrument was considered reliably for used in the study. Then, the researcher administered the pre-test with the help of the Mathematics teachers in each school, after which the Mathematics teacher introduced the researcher to the students as their temporary Mathematics teacher. The researcher then started the treatment with the students for a period of eight weeks, after which a post-test was administered to the students.

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The students were assigned numbers to write on their scripts both in the pre-test and post-test, which help the researcher in matching each of the students' script.

Mean and standard deviation were used in answering the research questions, while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

RESULT

Research Question 1

Do students taught Arithmetic progression using peer led team learning and those taught using lecture method differ in their academic performances?

Mean was used to answer the research question and summary data shown in Table 1

Table 1: Mean and Standard Deviation for Pre-test Post-test Performance in Arithmetic Progression

Group	Pre-test Mean	Standard Deviation	Post-test Mean	Standard Deviation	N
Peer Led Learning	30.47	5.28	55.90	10.81	100
Lecture Method	30.50	5.62	45.02	9.15	200

The summary of result in Table 1 showed that the mean of the students' performance in the post-test taught Arithmetic Progression using peer led team learning is 55.90, while that of students taught using lecture method was 48.02. The mean difference between the two groups was 10.88, which implies that the two groups (peer led team learning and lecture method) differ in their academic performance in Arithmetic Progression.

Research Question 2

Do male and female students taught Arithmetic progression using peer led team learning differ in their academic performances?

Mean and standard deviation were used to answer the research question and summary data shown in Table 2.

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Table 2: Mean and Standard Deviation for Male and Female Students

Group	Pre-test Mean	Standard Deviation	Post-test Mean	Standard Deviation	N
Male	29.22	8.22	56.27	9.80	106
Female	28.94	7.89	55.52	11.85	94

The summary of result in Table 2 showed that the mean performance of male students in the post-test taught Arithmetic Progression is 56.25, while that of female students is 55.58. The mean difference between the two groups (male and female) is 0.75, which is very negligible. Therefore, it appears that there is no difference in the performance of male and female students taught Arithmetic Progression using peer led team learning.

Null Hypothesis 1

There is no significant difference in the academic performance of students taught Arithmetic Progression using peer led team learning and those taught using lecture method in Uyo Local Government Area.

Analysis of covariance was used in testing the hypothesis and summary data shown in Table 3

Table 3: Analysis of Covariance for Test of Difference in Pretest-Posttest Performances of Students in the Experimental and Control Groups.

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1722.81[a]	2	861.405	8.64	.00
Intercept	28931.300	1	28931.300	290.26	.00
Pretest	202.45	1	202.45	2.03	.16
Group	1405.85	1	1405.85	14.10	.00
Error	9469.03	395	99.67		
Total	276600.000	398			
Corrected Total	11191.84	397			

a. R Square = .154 (Adjusted R Squared = .136)

The summary of result in Table 3 indicated that there is a significant difference in the performance of students taught Arithmetic Progression using Peer led team learning and

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those taught using lecture method F(1,398) = 14.105 p<0.05. Therefore, the null hypothesis of no significant difference in the academic performance of students taught arithmetic progression using peer led team learning and those taught using lecture method is rejected. Hence, there is significant difference in the academic performance of students taught Arithmetic progression using peer led team learning and lecture method.

Null Hypothesis 2

There is no significant difference in the academic performance of male and female taught Arithmetic Progression using peer led team learning in Uyo Local Government Area.

Analysis of covariance was used to test the hypothesis and summary data shown in Table 4

Table 4: Analysis of Covariance for Test of Difference in Pretest-Post-test Performances of Male and Female Students.

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	49.88[a]	2	24.94	.206	.81
Intercept	18314.19	1	18314.19	151.42	.00
Pretest	44.23	1	44.23	.34	.55
Group	6.78	1	6.78	.06	.81
Error	5684.61	39	120.95		
Total	161975.00	198			
Corrected Total	5734.50	197			

a. R Square = .009 (Adjusted R Squared = .033)

The summary of result in Table 4 indicated that there is no significant difference in the mean performance of male and female students taught Arithmetic Progression using peer led team learning F(1,198) = 0.06, P>0.05. Therefore, the null hypothesis of no significant difference in the performance of male and female students taught Arithmetic Progression using Peer led team learning is not rejected.

DISCUSSION OF FINDINGS

The summary of result in Table 3 indicated that there is a significant difference in the performance of students taught arithmetic progression using peer led team learning and those taught using lecture methods. As shown also in Table 1, students taught Arithmetic Progression using peer led team learning out performed those taught using lecture method with a mean of 55.90 and 45.02 respectively. The high performance of students in the peer led team learning could be due to the students being actively involved in their learning and also being free to ask question where it in necessary without any fear. The findings of this study is in line with that of Wells (2012) who investigated the impact of peer-led team

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learning (PLTL), on secondary school students' conceptual understanding of biology in evolution. Using a mixed methods approach, data were gathered quantitatively through pre/post-testing using a repeated measures design and qualitatively through observations, questionnaires, and interviews. The result of the findings identified positive attitudes towards the implementation of PL TL, with students reporting gains in conceptual understanding, academic achievement, and interdependent work ethic.

The summary of result in Table 4 showed that there is no significant difference in the performance of male and female students taught arithmetic progression using peer led team learning. This could be due to cooperation by members of each group and competition between groups. Everyone always wants to have the best presentation when given the chance to lead the class. The findings of this study support that on Depaz and Moni (2008), who conducted a study on peer led team learning and students' academic performance in organic chemistry. The study compared student performance, retention rates (within the program), and attitudes of students participating in the PLTL workshops versus students in the traditional recitation sessions; also comparison of male and female performance in the peer lead team learning group was carried out. Recitation sessions were the traditional means to aid organic chemistry students during the term. The findings of the study indicated that there was no significant difference in the performance of male and female students who participated in the peer led team learning group.

CONCLUSION

Based on the findings, it is concluded that peer led team learning method of teaching arithmetic progression is better than lecture method in Uyo Local Government Area as both peer led was not gender sensitive.

Recommendations

Based on the findings of the study, the following recommendations were made;

1. Peer led team learning should be used in the teaching of arithmetic progression in mathematics.

2. Teachers should be trained on how to use peer led team learning effectively.

REFERENCES

Castano, C. (2008). Socio-scientific discussions as a way to improve the comprehension of science and the understanding of the interrelation between species and the environment. *Research Science Education*, 38, 565-587.

Depaz, I. and Moni, R. (2008). Using peer teaching to support co-operative learning in undergraduate pharmacology. Bioscience education E-Journal, 11, 1-12.

Eraikhuemen, L. (2003). The influence of Gender and School location on Students' Academic Achievement in Senior Secondary School Mathematics. *Ife Journal of Theory and Research in Education.* 7(2), 99-112.

Hodson, D. (2003). Time for action: Science education for an alternative future. *International Journal of Science Education*, 25(6), 645-670.

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

Nachmias, F. C. & Nachmias, D. (2009). *Research methods in the social science*s. London. St. Martin's Press Inc.

Nwafor, S. O. (2012). Educational Administration: Concepts and Practices (2nd edition).Port Harcourt: Bassey Joe Printers.

Quitadamo, I. J., Brahler, C. J., & Crouch, G. J. (2009). Peer-led team learning: A prospective method for increasing critical thinking in undergraduate science courses: *Science Educator*, I8(1), 29-39.

Ramaswamy, S., Harris, I., & Tschimer, U. (2001). Student peer teaching: An innovative approach to instruction in science and engineering education. *Journal of Science Education and Technology*, 10(2), 165-171.

Rennie, L. J., Goodrum, D., & Hackling, M. (2001). Science teaching and learning in Australian schools: Results of a national study: *Research in Science Education*, 31,455-498.

Tessier, I. (2007). Small group peer teaching in an introductory biology class. *Journal of College Science Teaching*, 31, 455-498.

Tien, L. T., Roth, V., & Kampmier, I. A. (2002). Implementation of a peer-led team learning instructional approach in an undergraduate organic chemistry course. *Journal of Research in Science Teaching*, 39(7), 606-632.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* London, England: Harvard University Press.

Weber, K., Maher, C., Powell, A., & Stohl, L. (2008). Learning opportunities from group discussions: Warrants become the object of debate. *Educational Studies in Mathematics*, 68, 247-261).

Wells, T. (2012). Peer-Led Team Learning as an Instructional Strategy for Secondary School Science. A Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Education Faculty of Education, Brock University St. Catharines, Ontario.

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)