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EFFECTIVENESS OF LESSON STUDY AND TEAM TEACHING STRATEGIES ON SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN MATHEMATICS IN NSUKKA LOCAL GOVERNMENT AREA

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ABSTRACT

The main aim of carrying out research in mathematics education is to enhance teachers' classroom performances and students' academic achievement in mathematics. This study is on effectiveness of lesson study and team teaching on secondary school students' achievement in mathematics in Nsukka Education Zone. The study was pretest-post-test, non-equivalent and non-randomized,, quasi experimental design. Two co-educational schools were purposively selected from 22 co-educational schools in the 31 public secondary schools in Nsukka Local Government Area. 80 students were drawn out of population of 7,200 students in the public schools. The instrument used for the study was a validated mathematics achievement test (MAT) which has a reliability coefficient of 0.78 estimated using Cronbach alpha formulas. The data obtained were analyzed using mean and analysis of covariance (ANCOVA). The results obtained showed that lesson study has a significant effect on students' achievement in mathematics. Gender was also found to have significant influence on students' achievement in mathematics as the female students achieved higher than the male students. The recommendation is that mathematics teachers should adopt the lesson study method of teaching in teaching students mathematics to enhance students' achievement and sustainability in mathematics education.

Key Words: Lesson study, team teaching, mathematics, achievement.

INTRODUCTION

Mathematics is a subject that cut –across every aspects of human life. The importance of mathematics is mostly felt in the area of science and technology. Awofala (2013) stated that mathematics is the backbone of technological breakthrough. Chinweoke (2015) posited that the importance of mathematics in the scientific, technological and economic development of any nation has made its teaching and learning in secondary school very important. In the same vein, the importance of mathematics education to national development cannot be over-emphasized. Mathematics education is a very wonderful tool for sustainable development (Chinweoke, 2014). Mathematics is the avenue for production of scientific and technological workforce needed by our country for wealth creation (Chinweoke and Ifeakor, 2010).

The importance of mathematics to nation buildnghas made the Federal Republic of Nigeria (2004) to make mathematics a core and a compulsory subject at both primary and secondary school levels of education. In spite of the recognition accorded to mathematics as an important subject, the poor performance of students in the subject seems to be a source of worry to every individual and society at large. The mass failure recorded nationwide indicated persistent mass failure of students in mathematics.

According to West African Examination Council (WAEC), in 2012 WASSCE, 649,156 candidates (38.81 percent) has credits in English language and mathematics, in 2013, 610,334 (36.57 percent) of the candidates obtained five credits including English language and mathematics while in 2014 WASSCE, 529,425 candidates (31.28 percent) recorded five credits in the two important subjects (Otti, 2015). The result shows students' persistent poor performance in mathematics.

One of the factors that attribute to students poor performance in mathematics centres on teacher teaching effectiveness. Hassan (2014) pointed out that some mathematics teachers mystify the teaching of mathematics

which makes it boring, monotonous and consequently forced students to develop apathy towards mathematics. Some concepts in mathematics require adequate attention to be paid to their teaching and learning for proper understanding by the students. One of such topics is mensturation. Menstruation is a branch of mathematics that deals with plane shapes and solid shapes. This topic needs proper preparation and planning before embarking on classroom instruction for effective teaching and learning to take place. This follows from the fact that the success of any instruction depends to a large extend on the teacher teaching method.

In view of the foregoing, the teaching strategies such as team teaching and lesson study seem to be the appropriate teaching strategies that may enhance students understanding of mathematics.

The lesson study is a process where teachers work collaboratively on a small group. Working on lesson study involves planning, teaching, observing, critiquing lessons. The strategy was adopted by Japanese where teachers develop professionally through the sharing of their practice through 'research lessons'. In operating on lesson study, teachers jointly draw up a detailed plan for the lesson which one of the teachers uses to teach in a real classroom (while others watch the lesson). After teaching, the group comes together to discuss their observation which they use to improve on the next lesson.

Cerbin and Kopp (2006) described lesson study as a form of classroom inquiry in which several teachers collaboratively plan, teach, observe, revise and share the results of a single class lesson. Teachers work together by forming a team, develop learning goals, design the lesson, plan the study, teach and observe, analyze and revise, document and disseminate the result to others. In the lesson, teachers explore carefully how student's learning, thinking and behaviour change as a result of the lesson. Cerbin (2011) emphasized that the primary purpose of lesson study is to help teaches' better understand how to support students learning. By observing how students learn through lesson study, teachers can improve their own teaching and build knowledge that can be used by other teachers to improve their classroom practices for professionally develop themselves.

Team teaching is a mode of instruction in which two or more educators or other certified staff members share responsibility for a group of students in a single classroom or workplace. Team teaching involves two or more teachers, their primary concern is to share experiences in the classroom and co-generate dialogue with each other. Team teaching provides enhanced opportunity for the students to learn and increases educational opportunities for all students (Stanford University, 2006).

Team teaching gives the participating team teachers a supportive environment, allows for development of new teaching approaches, aids in over-coming academic isolation, increases the likelihood of sounder solutions regarding the discipline of problematic students and augments the opportunity for intellectual growth (Goetz, 2000).

The influence of students' gender in their achievement in mathematics presents worries to education researchers. Gender bias is still prevalence in the mathematics classrooms. Igwe (2003) posited that gender is an important factor in educational setting which could be a hindrance to high achievement of learners in sciences, mathematics inclusive. Sex-role stereotyping seems to be the origin of differences between male and female achievement in mathematics (Okeke, 1990). Nworgu (2004) pointed out that there is an acknowledged problem of female under achievement when compared with their male counterparts apparently under equivalent conditions and this problem of female under achievement appear to be more pronounced in science and mathematics. Ifeakor (2005) observed that gender has no significant effect in students' achievements.

Literature has not revealed yet any evidence that comparing lesson study and team teaching is gender related; the study is deemed imperative to investigate on how lesson study and team teaching would bridge the gap in mathematics achievement between male and female students. The purpose of the study is to examine the effectiveness of study lesson and team teaching strategies on secondary school students' achievement in mathematics in Nsukka local Government Area.

Research Questions and Hypotheses

The study was guided by two research questions and two hypotheses

Research Questions

1. Which group of students achieved better, those taught with lesson study or those exposed to team teaching?
2. What is the influence of lesson study and team teaching on male and female students mean achievement scores as measured by mathematics achievement test (MAT).

H_{01}: There is no significant difference (P≤.05) in the mean achievement scores of students exposed to lesson study and those exposed to team teaching as measured by MAT.

H_{02}: The mean achievement scores of male and female students on lesson study and team teaching as measured by MAT would not differ significantly (P≤ .05).

Methodology

The study was a pretest-posttest non equivalent, non-randomized quasi- experimental design because of use of intact classes. The population of the study comprised 7,200 students in Senior Secondary class one (SSI) in Nsukka Local Government Area of Enugu State.

There are 31 public secondary schools out of which 22 are co-educational. Three co-educational schools were purposively selected from the 22 co-educational schools. The sample of the study was drawn from the three co-educational schools. Random sampling was used to select one intact class from each school. Treatment was randomly assigned to each of the three intact classes, one for lesson study another for team teaching and the other for control group. The subjects of the study consisted of 80 students (30 male and 50 female).

The instrument used for the study was a standardized Mathematics Achievement Test (MAT). The instrument comprised 30 items of multiple choice achievement tests. The instrument was validated by three university lecturers' experts in item construction and evaluation. The internal consistency was established using split half method and the reliability coefficient of 0.78 was estimated using Cronbach Alpha method.

The pre-test on MAT was administered to the subjects under study before the commencement of the actual experiment. The subjects in the three groups were taught the same topics (plane shapes and solid shapes) for four weeks. A total of six weeks was used for the study. The first two weeks was devoted to organizing and training of teachers and administering of pre-test. After the treatment, post test was administered to the subjects in the three treatment groups using the same MAT.

Data collected were analyzed using mean for answering research questions and analysis of co-variance (ANCOVA) for testing the research hypotheses at .05 level of significance.

Results

The results of the data analyzed based on the two research questions and two null hypotheses that guided the study are presented below;

Research Question I

Which group of students achieved better, those taught with lesson study (LS) or those exposed to team teaching (TT) as measured by the Mathematics Achievement Test (MAT)?

Table 1: Mean Achievement Scores (X) and standard deviation (SD) of students achievement in mathematics

Experimental Groups	N	Pretest X_1	SD SD_1	Posttest X_2	SD SD_2	Gain score
Lesson study	40	8.18	3.08	15.05	5.05	6.87
Team teaching	40	7.87	3.08	12.31	3.91	4.44

From table 1, the students exposed to lesson study had mean achievement score of 15.05 while those taught with team teaching had mean achievement score of 12.31. Thus, the students taught mathematics using lesson study achieved better than those taught with team teaching method.

Research Question 2

What is the influence of lesson study and team teaching on male and female students' mean achievement scores as measured by MAT?

Table 2: Mean Achievement Scores (X) and Standard Deviation (SD) based on gender as measured by MAT

Gender	N	Pretest		Posttest		Gain score
		X_1	SD_1	X_2	SD_2	
Male	30	8.33	3.19	12.78	4.33	4.45
Female	50	7.36	2.74	15.68	4.94	8.32

Table 2 revealed that male students had mean achievement score of 12.78 with SD 4.33 while the female students had mean achievement score of 15.68 and SD of 4.94. Thus, the two teaching methods had positive influence on female mean achievement score than that of their male counterparts. Female students benefits more than male students.

Hypotheses

H_{01}: There is no significant difference ($P \leq .05$) in the mean achievement scores of students exposed to lesson study and those exposed to team teaching as measured by MAT.

Table 3: Analysis of Covariance (ANCOVA) on mean achievement scores of students in mathematics

Source of variations	Sum ofsquares	df	Mean squares	F_{-cal}	Table
Corrected Model	375.943	4	93.986	5.157	2.45
Intercept	1990.635	1	1990.635	109.216	
Pretest	10.142	1	10.142	.056	
Mode of instruction	183.166	1	183.166	10.049	
Gender	39.514	1	39.514	2.168	
Mode of instruction Gender	115.349	1	115.349	6.329	3.92
Error	1348.766	75	17.984		
Total	16544.000	80	7.984		
Corrected total	1724.709	79			

Results from table 3 revealed that the calculated F-value on achievement scores is 5.157 as against the Table-value of 2.45. The null hypothesis of no significant mean achievement scores is therefore rejected. This implies that those taught with lesson study achieved significantly higher than those taught with team teaching method.

H_{02}: The mean achievement scores of male and female students on lesson study and team teaching would not differ significantly ($P \leq .05$).

From the result on table 3 above F-calculated based on gender is 6.329 as against F-table of 3.92. The null hypothesis of male and female achievement score would not differ significantly was rejected. This implies that there is significant difference in the mean achievement scores of male and female students taught mathematics using lesson study and team teaching mode of instruction. The female students achieved significantly higher than the male students.

Discussion of Results

The result in Table 1 revealed that mean achievement scores of students pretest in the two teaching methods LS (X8.18) and TT (7.87) show that they are non-equivalent groups even though their standard deviations of 3.08 and 3.08 respectively revealed the difference is not significant. The result from the table 1 also showed that as a result of the treatment given to both groups, the mean achievement score of the LS group (15.05) is higher than that of TT (12.31) which implies that the students taught mathematics using lesson study achieved better than those taught with team teaching method and also that LS and TT methods are effective in teaching students mathematics judging from pretest and posttest mean-scores.

The students exposed to lesson study did better probably because of the teachers' collaborative effort in planning the lesson together and observe one of the teachers teaches and together make corrections at the end of the lesson which help another teacher to improve on the next teaching. According to Cerbin (2011), the primary purpose of the lesson study is to help teachers better understand how to support students learn and by observing how students learn through lesson study, teachers improve their own teaching and build knowledge that can be used by other teachers to improve their classroom practices. Team teaching group of students result may be as a result of each teacher teaching the area of his/her expertise which may require using method probably lecture method which does not encourage students using their five sense organs. While the lesson study collaboratively plan how to teach, employing various techniques that may help students to achieve better in mathematics.

The findings of the study also show that female students achieved better than male students in mathematics taught with the two teaching methods. This shows that the teaching methods are highly effective in teaching female students. This result happens to contradict the view of Nworgu (2004) that female under achievement is pronounced in science and mathematics. This result also disagrees with that of Ifeakor (2005) on gender having significant effect in students' achievement. The implications of the results obtained above is that lesson study and team teaching are good teaching strategies that enhance students achievement in mathematics and again lesson study should be used to bridge the gab between male and female achievement in mathematics to encourage female participation in global competition.

Conclusion

This paper examined the effectiveness of lesson study and team teaching on secondary school students' achievement in mathematics in Nsukka Education Zone.

The results obtained, revealed that

1. Students taught mathematics using lesson study approach achieved better than those taught with team teaching approach.
2. The female students achieved significantly higher than their male counterparts mathematics achievement test.

Recommendations

Based on the above findings and implication the following recommendations are made:

1. Since the use of lesson study was found to be highly effective in enhancing students' achievement in mathematics, mathematics teachers are advised to use it in teaching students mathematics and debase the use of lecture method. Mathematics teachers should also make use of lesson study in teaching of abstract concepts in mathematics in the classroom to enhance students understanding and achievement in mathematics. It is a recommended teaching method for teaching in girls' schools.
2. Mathematics teachers should be encouraged by their principals to attend conferences and workshops organized by educational bodies such as STAN to equip themselves with new trend in teaching strategies so as to improve on their classroom teaching approaches.
3. Teachers should engage themselves in the use of lesson study in teaching mathematics for professional development as this teaching method encourages teachers' collaborative involvement and engagement in development of the lesson plan. This teaching method is highly important in the professional development of newly recruited teachers.

REFERENCES

Awofala, A.O.A (2012). An analysis of the new-9-year basic education mathematics curriculum in Nigeria. *ACTA DIDACTICA NAPOCENSIA*, 5(1) dpp.ubduj.rol/adn/article-5-1-3pdf.

Cerbin, B. and Kopp, B. (2006). Lesson study project overview. www.uwlax.edu/sofl/lsp/overview.htm.

Cerbin, B.(2011). Lesson study using classroom inquiry to improve teaching and learning in higher education Sterling, VA: Stylus publishing, LLC.

Chinweoke, F.U and Ifeakor, A.C (2010). Appraisal of the pre-requisite competencies/skills needed by secondary school mathematics teachers to improvise teaching resource materials. *51st Annual Conference of Science Teachers Association of Nigerian, 339-345.*

Chinweoke, F.U. (2014). Teacher education a vehicle for sustainable development in Nigeria. *ANSU Journal of Educational Research, ANSUJER (special edition).* A publication of the Faculty of Education Anambra State University, Uli, 1-8.

Chinweoke, F.U. (2015). Reforms in secondary schools mathematics curriculum in Nigeria: a need for human resource development for global competitiveness. *American Academic and Scholarly Research Journal 7(5):121-129.*

Federal Republic of Nigerian (2004). *National policy on education, Lagos, NERDC Press 4th Edition.*

Goetz, K. (2000). Perspectives on team teaching. *EGallery 1(4), August. http://www.ucalgery.,cal~egallery.*

Hassan, A.L. (2014). The effectiveness of activity based instruction in the concept of regular based volume and capacity. *Journal of issues on Mathematics, 16(11):44-51.*

Ifeakor, A.C. (2005). Effect of commercially produced computer assisted instruction package on students' achievement and interest in secondary school chemistry. *Unpublished Ph.D, Nsukka University of Nigeria.*

Igwe, I.T (2003). Enriching science education: The place of improvisation in classroom. *Proceeding of the 41st Annual Conference of Science Teachers Association of Nigerian, 51-53.*

Nworgu, L.N. (2004). Effects of gender sensitization of science teachers on gender gap in science achievement and interests among students. *Unpublished Ph.D. dissertation, Nsukka, university of Nigeria.*

Okeke, E.A.C. (1990). Gender, Science and Technology in Africa: A Challenge for Education. *The Rama Mehta Lecture 1990.* Cambridge, Radcliff. College.

Otti, S. (2015). Mathematics made easy. *Daily Sun Newspaper, Tuesday 23.*

Stanford University (2006). Team teaching: Benefits and challenges, *Fall 2006. Newsletter, 16(1).* Web.stanford.edu/dept/teamteaching.