USING CO-OPERATIVE AND PEER-GROUP TEACHING STRATEGY IN TACKLING POOR PERFORMANCE OF STUDENTS IN MATHEMATICS IN SECONDARY SCHOOL STUDENTS IN EBONYI STATE.

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Abstract
This study titled, "using co-operative and peer-group teaching strategy in tackling poor performance of students in mathematics in secondary school students in Ebonyi State" was amid at ascertaining the effect of using co-operative and peer-group teaching strategy over conventional method of teaching mathematics. The study has two research questions and two hypotheses. It is a quasi-experimental research design that made use of 150 senior secondary school students and 3 Mathematics teachers to generate data from the instrument called "Mathematics Achievement Test (MAT)". The instrument contains 30 multiply choice questions with option A –D formed from menstruation aspect of senior secondary mathematics. Data for the study was generated by administering the same MAT to both experimental and the control group. Data collected was analyzed using mean and standard deviation for research questions and analysis of covariance (ANCOVA) for hypotheses. Results showed that cooperative and peer-group teaching strategy enhanced achievement of students in Mathematics better than the conventional teaching method for both male and female students with male students performing better in both methods. There was also a significant difference in the mean achievement scores of students taught Mathematics using the cooperative and peer-group teaching strategy than those taught using the conventional method. Based on the results the researchers recommended among other things the use of cooperative and peer-group teaching strategy for teaching secondary school students.
Key words: *Co-operative, Peer-Group, Teaching Strategy, Poor Performance and Mathematics*

Introduction

Over the years, students' abysmal and very low performance in mathematics in both internal and external examination like West African Senior School Certificate Examinations (WASSCE) as well as other public examinations in Science, Technology and Mathematics (STM) is nothing to write home about. It can be described as anything but good. Despite its importance in the society, pupils and students dread it and also have the obnoxious notion,

erroneous believe and very wrong impression that mathematics learning is unattainable task, that it is exclusively reserved for the gift ones. Right from the Primary School, it is disheartening and disappointing to observe that the innocent children due to ignorance built up their minds that mathematics cannot be passed except by or through exposition; this is very wrong and should be reversed.

For instance, in May/June, 2009, the WAEC Chief Examiners Report, gave the summary of candidates' weaknesses in mathematics, the report said, " apart from not giving answers to the required degree of accuracy, majority of the candidates could not apply basic concepts and theorems correctly in some aspects of the syllabus. Such areas of the syllabus the reported stated include: menstruation in the 3 - dimensional shapes, circle geometry, trigonometry and Geometrical constructions". The report went further to State that, “many candidates were able to solve the inequality problems but were unable to get the greatest value of x".

Furthermore, WAEC Chief Examiners Report, (2009 -2014) pointed out to similar problem, when they reported that, "a large number of candidates did not record to the accuracy expected of their measuring instruments. Others did not record all their readings to the same accuracy. Therefore, they lost marks for inconsistency in expressing their answers in significant figures required from them. Some candidates approximated too early in reading data table, for example, since, cosines and reciprocals should be recorded to at least 3 decimal places (3 d. p). Some candidates choose large scales for their reading and graphs but were unable to make their points correctly due to wrong interpretation of the intervals".

It has been observed too, that majority of Nigerian children generally have phobia for mathematics. Most of fern consider it to be very complex, difficult and abstract and therefore, detest studying it. Worst still, many students do not see the immediate use or applicability of the subject to their lives and wondered why they should be bordered or troubled learning or studying it, except a requirement for admission into the institutions of higher learning. But it is pleasing to note that Okafor and Anaduaka, (2013) has this to say, "majority of those who claim to be mathematics teachers are either not convinced themselves or do not consider it needful to let students know the benefit that could be derived from the study of mathematics beyond being a necessity for entry into Colleges, Polytechnics and Universities". Unless students are exposed to many and variety uses of mathematics and of mathematical knowledge, they may never come close to realizing it. There!-is no gain saying the fact that, the quality and attitude of a teacher,

determines to a great extent the magnitude of academic achievement of his/her students. A popular saying has it that in the present academic world and among the educationist ‘in particular, the success or otherwise, of any system depends on the number, quality, competence of teachers in that system, mathematics inclusive. There is a popular saying among .educationists too, about teachers as follows: I,

"Poor teacher tells
An average teacher informs,
A good teacher teaches, while
An excellent teacher, inspires and motivates"

No teacher can teach what he-.does not now. Incompetent teachers should have the greater part of the blame on the woes surrounding Mathematics - Education in Nigeria today. Many mathematics teachers toy with the all important subject today without realizing the untold hardship it has on the victims - (students).There are topics in Mathematics that require expert handling for instance, teaching inequalities, series and sequences, distances on the earth's surface (latitudes and longitudes), logarithms, trigonometry, graphs, probability, plane and solid shapes, statistics, quadratic equations, simultaneous linear equations, circle and gradients of curves, bearings, word problems, variations, compound interest, modular arithmetic, geometrical transformations and vectors, relations and functions etc. All these topics in mathematics require special skills, strategies to sink down the basics, concepts, rules, techniques and principles in the minds of students. From experience, only a skillful teacher with ingenuity can do this. A teacher who is resourceful, innovative, effective, competent and knowledgeable can take students to the Promised Land in terms of leading the students to recognize the importance of mathematics and then, embrace it.

A survey carried out by a body set up by the Federal Government of Nigeria which is charged with the responsibility to the strengthening the teaching of Mathematics and Science in Nigeria revealed that mathematics and science are taught with "chalk and talk" delivery method. The pupils/students are not given the opportunity to participate actively during mathematics and science classes. Okafor and Anaduaka (2003) again observed that, "Every individual require the knowledge of mathematics to function effectively and efficiently in today's world irrespective of his / her profession or job". Students’ inability to learn mathematics well due to very poor up - bringing in the subject does not augur well for Nigeria especially now the entire globe is driven by technology and science in strengthening mathematics and science-education in the country.

SMASE (2006) is established to take mathematics away from its abstract nature to real life situation; the programme will also enhance a positive change in both teachers and the learners in mathematics. To make mathematics more practical, more embracing, loving, pleasurable and to see whether we can change the attitude of the people in it, if the following stakeholders in SMASE project like National Teachers Institute (NTI), Universal Basic Education Commission (UBEC), Teachers Registration Council of Nigeria (TRCN), Nigerian Education Research and Development Council (NERDC), State Universal Basic Education Board (SUBEB), Japan international Cooperation Agency (JICA) and the Federal Ministry of Education (FME) plus quality and competent teachers in the school system, the war against poor performance in secondary school mathematics will be won. Mathematics no doubt, encourages the habit of self-reliance and helps the learner to think and solve their problems themselves. All mathematical topics, beyond computational skills, have one habit or the other, it inculcates in the mind of the learner.

Good knowledge of mathematics promotes the habit accuracy, logical reasoning, systematic and orderly arrangements of facts in the individual learners. Mathematics equally helps to develop good moral habit and gives no room for biased feedings in life. The ingredients required to inculcate all these in the minds'-of the learner lies in the hands of a good teacher in mathematics. Something urgent has to be done to save mathematics.

Statement of the Problem

A large part of poor performance by students in mathematics, science and technology subjects like physics, chemistry and biology in, various examinations by WAEC and NECO every year,-has been attributed to very poor mathematical background by secondary school students. This ugly trend was routed right from the Primary School. The teaching of mathematics basic concepts, skills, ideas, guide-lines and competence is zero due to bad method of teaching from Primary School. The poor performance by students in the subject has been moving from bad to worse. 0' conner, Kanja and Baba (2011) identified the following among others as the remote causes of this ugly trend; inadequate assignments to students, inadequate coverage of the syllabus, inappropriate teaching technique, negative attitude of students towards mathematics, lack of incentives to mathematics teachers. From the above, it can also be discovered, that some teachers skip what they see as difficult topics thereby compounding the problems. The main

issue now is what method approach and technique can be employed by a teacher to tackle this ugly trend? This is a big problem.

The need to go into the above research not over-stressed Mathematics -Education, its teaching and learning has been murdered by bad teachers in Nigeria i.e incompetent, unqualified, ineffective and "I can teach" teacher. The attainment of the Sustainable Millennium Development Goal (MDG) and achievement of the critical targets of National Economic Empowerment and Development Strategies (NEEDS) which include value orientation, poverty eradication, job creation, wealth generation and empowering the citizens through education of which mathematics is a key player and a change agent. This may be a mirage if nothing urgent, s done. In a paper titled, "Nigerian school children and mathematics phobia: How the mathematics teacher can help" Okafor and Anaduaka (2013),-noted the importance of mathematics and why it is of utmost necessity that all Nigerian children acquire mathematical knowledge. It noted with dismay the general negative students' attitude towards the subject and their consequent poor performance in it in WASSCE. It then went into looking at the attributes of a change in the teaching and learning mathematics and in the attitude of students towards the subject. What then is the practices that can stimulate and sustain students' interest in Mathematics learning, only a sound, qualified, competent, effective, knowledgeable, well motivated and skilled teacher has the answer. This is the rationale for this study. How can he be identified? Teachers, students, researchers, authors, parents will benefit from the outcome of this study.

Purpose of the Study

The purpose of this study is to find the effect of cooperative and peer-group teaching strategy on students' performance in mathematics in Secondary School in Ebonyi State. In particular the study will determine;

1. the impact of cooperative and peer-group learning environment on students performance in mathematics.
2. the mean achievement scores of male and female students taught Mathematics using cooperative learning strategy.
3. the interaction effect of method and gender on students mean achievement in Mathematics.

Research Questions

The following research questions will guide the study:

1. What is the impact of cooperative and peer-group learning environment on students' performance in mathematics?
2. What are the mean achievement scores of male and female students taught Mathematics using cooperative learning strategy?
3. What is the interaction effect of method and gender on students mean achievement in Mathematics?

Hypotheses:

$H0_1$: There is no statistically significant difference in the mean achievement scores of students taught mathematics with the cooperative and peer-group teaching strategy and those taught with the conventional method.

$H0_2$: There is no statistically significant difference in the mean achievement scores of students taught mathematics with variety of methods and those taught with the traditional.

Method

This study will adopt the quasi-experimental design. It is a Non- randomized control - Group pretest- post test design. This means that intact classes of students were used. Specifically, the pre-test, post-test non-equivalent control group design was used to determine the reliability of the instrument. The subject was presented before treatment was administered. After treatment the test was repeated, which constitutes the post-test. This is to determine the efficacy of the independent variable (treatment) on the dependent variable (achievement).

The population of the study is all the secondary school student and mathematics teachers in the entire Ebonyi State. A sample of 150 students made up of 50 (SS1) students and a mathematics teacher from each of the three Zones. The selection was done using simple random sampling techniques. The sample comprised of a total of 150 students and three teachers. The sample was also made up of (80) Females students and (70) Male students. The experimental group has eighty (80) students as sample for the study while the control group has seventy (70) students.

The instrument used for data was called "Mathematics Achievement Test (MAT)". The (MAT) consisted of 30 multiply choice questions with option A -D Constructed from the content

menstruation aspect of senior secondary school syllabus. Each question has only one correct option. Each correct answer attracts two marks while each wrong answer attracts zero mark. The instrument received both Content and facial validation from experts in Mathematics –Education and Measurement and Evaluation Departments of both Ebonyi State ollege of Education and Alex-Ekwueme Federal University Ndufu_Alike Ikwo. Reliability of MAT was established using Kuder -Richardson formula 20.

Descriptive statistics of which mean and standard deviation was used to answer the research questions, while the analysis of covariance (ANCOVA) was employed to test the hypotheses. All hypotheses were tested at an alpha (0.05) level of significance.

Results

The results were presented in tables in accordance with the research questions and hypotheses that guided the study.

Research Questions 1

What is the effect of cooperative learning strategy on students' achievement in Mathematics?

To answer this research questions, reference was made to the information on table 1, the data was obtained using the Mathematics achievement test administered to both the experimented and control groups involved in the study. The pretest and posttest scores were adjusted simultaneously during the analysis. The summary of the result is shown on table 1.

Table 1: Mean and Standard Deviation of achievement scores of students taught Mathematics using the cooperative and peer-group learning strategy and those taught with the conventional method

Group	**Adjusted Mean**	**SD**	**N**
Treatment	71.37	14.65	150
Control	48.07	9.23	150

The result on table 1 showed that students taught Mathematics using cooperative and peer-group learning strategy had an adjusted mean achievement score of 71.37 and standard deviation score of 14.65 while those taught using the conventional method had an adjusted mean achievement score of 48.07 and standard deviation score of 9.23. The implication is that cooperative and peer-

group learning strategy enhanced achievement of students in Mathematics better than the conventional teaching method and that conventional method is less scattered in their scores.

Research Questions 2

What are the mean achievement scores of male and female students taught Mathematics using cooperative learning strategy?

Data collected from male and female students in the treatment group were only used to answer this research question.

Summary of result is presented in Table 2

Table 2: Mean and standard deviation of achievement scores of male and female students taught Mathematics using cooperative and peer group teaching strategy.

Group	**Adjusted Mean**	**SD**	**N**
Male	78.90	12.33	80
Female	62.76	12.19	70

Result as presented on table 2 showed that the male students had a mean achievement score of 78.90 and standard deviation score of 12.33 while the female students had a mean achievement score of 62.76 and standard deviation score of 12.19. This implies that cooperative learning strategy favoured the male students more than their female counterparts with little difference in spreading in favour of female.

Research Question 3

What is the interaction effect of method and gender on students mean achievement in Mathematics?

Data collected for male and female students in both the treatment and control groups were used to answer this research questions.

Summary is presented in Table 3.

Table 3: Effect of method and gender on students' mean achievement in Mathematics.

Gender groups	**Adjusted mean for Treatment Group**	**Adjusted Conventional Mean for Method**
Males	78.90	50.22
Females	62.70	46.08

Summary of results presented in Table 3 revealed that male students had a mean achievement score of 78.90 and standard deviation of 50.22 while female students had a mean achievement of 62.70 and standard deviation of 46.08. Results presented in the table indicated that cooperative learning strategy is superior to the conventional approach at the two levels of gender (male and female).

Hypotheses

Ho_1: There is no statistically significant difference in the mean achievement scores of students taught mathematics with the cooperative and peer-group teaching strategy and those taught with the conventional method.

Summary of results of the two hypotheses is as presented in table 4 below

Table 4: Analysis of co variance for students overall mathematics achievement scores by teaching methods and interaction between methods and gender

Source of variation	Sum of squares	Df	Mean square	F	F. probability
Covariates	16454.675	1	16454.675	220.256	.000
Pretest	16454.675	1	16454.675	220.256	.000
Main effects	45528.021	2	22764.010	304.710	.000
Method	42458.400	1	42458.400	568.331	.000
Gender	1487	1	1487	19.906	.000
2-way	1375.628	1	1375.628	18.414	.000
Interactions		1			
Method Gender	1375.628	1	1375.628	18.414	0.72
Explained	63358.320	4	15839.580	212.022	.000
Residual	2038.596	295	74.707		
Total	**85396.917**	**299**	**285.608**		

Result on table 4 showed that for hypothesis 1, the alpha level (0,05) is greater than the sig. of F value (.000). The decision rule is to reject the null hypothesis when the alpha level is greater than the sig. of F value. Based on the decision rule, the researchers rejects the null hypothesis and concludes that there is a significant difference in the mean achievement scores of students taught Mathematics using the cooperative learning strategy and those taught using the conventional method.

Ho_2: There is no statistically significant difference on the mean achievement scores of male and female students taught mathematics using the experimental teaching method.

Data collected using the Mathematics Achievement Test (pre and post-tests) for the Treatment group only was used to test his null hypothesis. Summary of result is presented in Table 5 instructional approach on male and female students achievement scores in Mathematics for treatment group only.

Source of variation	Sum of squares	Df	Mean square	F	F. Probability
Covariates	10436.792	1	10436.792	84.804	.000
Pretest	10436.792	1	10436.792	84.804	.000
Main effects	3454.771	1	3454.771	28.072	.000
Gender	3454.771	1	3454.771	28.072	.000
Explained	13891.563	2	6945.782	56.438	.000
Residual	18091.270	147	123.070		
Total	**31982**	**149**	**214.650**		

Result on table 5 shows that the alpha level (0.05) is greater than the significant of F value (0.00). Based on the decision rule, the researchers rejects the null hypothesis and concludes that there is a significant difference between the mean achievement scores of male and female students taught Mathematics using co-operative strategy.

Summary of Finding

This study recorded the following findings:

1. The mean achievement scores of students taught Mathematics using the cooperative learning strategy was higher than those taught using the conventional method. In addition, there was a significant difference in the mean achievement scores of students taught using cooperative learning and those taught using the conventional method.
2. The male students taught Mathematics using the cooperative learning strategy had a higher mean achievement score than their female counterpart. In addition, the difference in their mean achievement scores is statistically significant.

3. There was significant difference between the mean achievement scores of male and female students taught Mathematics using co-operative strategy.

Discussion of Findings

1 Effect of cooperative and peer group teaching Strategy on Students' Mean Achievement Scores in Mathematics

Result of analysis showed that students taught geometry using cooperative learning strategy achieved better than those taught with the conventional chalk-talk approach. In addition, result in table 1 showed that the difference in the mean achievement scores of students taught geometry using cooperative learning strategy and those taught using the conventional chalk-talk approach was significant in favour of the students taught using cooperative and peer group teaching strategy.

The result is in consonance with that of Timayi, Bolaji and Kajuru (2015) who recorded a significant difference in the mean achievement scores of students taught geometry using Jigsaw IV cooperative learning strategy (J4CLS) and those taught using the conventional chalk and talk method.

Furthermore, the finding is in agreement with that of Abdullahi (2014) who recorded a significant difference between the mean achievement scores of students taught Mathematics using cooperative learning approach and those taught using the conventional chalk and talk method. More so, the finding is in tandem with that of Effandi, Yusoff and Zulkarnain (2013) who recorded a significant difference between the main achievement scores of students taught Mathematics using Jigsaw cooperative learning approach and those taught using the conventional chalk and talk method.

The result is also in agreement with that of Adeleye (2012) who recorded a significant difference in the mean achievement of students taught Mathematics using cooperative learning as against those taught using individualistic approach of learning. It is equally in tandem with that of Hussain and Ahmed (2012) who recorded a significant difference in the mean achievement scores of students taught Mathematics using cooperative and peer group learning strategy as against those taught using the conventional teaching method.

2 Effect of Cooperative and Peer group teaching strategy on mean achievement scores of male and female students in Geometry

Finding of the study showed that the male students had a greater mean achievement score than their female counterparts. In addition, there was a significant difference in the mean achievement of male and female students taught geometry using cooperative learning strategy in favour of the males.

The result is in tandem with that of Abdullahi (2014) who recorded a significant difference in the mean achievement scores of students taught geometry using cooperative learning approach in favour of the male students. However, the result disagrees with that of Iji, Emiaku and Utubaku (2015) who recorded no significant difference in the mean achievement scores of male and female students taught trigonometry using Problem Based Learning.

3 Interaction Effect of Methods and Gender on Students Mean Achievement Scores in Mathematics

Result of the study revealed that there was no interaction effects between methods and gender on the students mean achievement scores in Mathematics. The results tables 2 and 3 showed that cooperative learning strategy was superior to the conventional chalk-talk approach at the two levels of gender (male and female)

The result is in consonance with that of Timayi, Ibrahim and Sirajo (2016) who recorded no significant difference in the mean achievement scores of students taught geometry using Jigsaw IV cooperative learning strategy (J4CLS) and those taught using the conventional chalk and talk method.

However, the result is in disagreement with that of Iji, Emiaku and Utubuaku (2015) who recorded a signification interaction between method of teaching and students gender on the students mean achievement in trigonometry using problem based learning.

Conclusion

In conclusion this study that investigated the effects of using co-operative and peer-group teaching strategy in tackling poor performance of students in mathematics in secondary school students in Ebonyi State made some useful discovery which will be of great impact to better teaching of mathematics if put into practice. The discoveries could be summarized that the use

co-operative and peer-group teaching strategy is sure way of improving students performance in mathematics.

Recommendations

On the strength of the results of this study, the researchers made the following recommendations:

1. That secondary schools mathematics teachers should inculcate the use of using co-operative and peer-group teaching strategy in tackling poor performance of students in mathematics in secondary school students in Ebonyi State.
2. That secondary schools administrators should create enabling environment and also provide the necessary teaching material for use in co-operative and peer-group teaching strategy in the State.
3. That study of this type should be carried out in other states of the federation to determine if actually the results are the same.

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