

EFFECT OF GROUP ALGEBRAIC BLOCKS STRATEGY ON UPPER BASIC STUDENTS' INTEREST IN ALGEBRA IN MUNICIPAL AREA COUNCIL ABUJA, NIGERIA

By

Ogbu Nneka Anthonia, Chibike Chidiebere and Tagwai Hadiza Garba.

Department of Science, Technology and Mathematics Education,

Nasarawa State University

Corresponding Author: anthonia_nneka@yahoo.com.

Abstract

The study investigated the effect of group Algebraic blocks strategy on upper basic students' interest in algebra. The population comprised all public schools in Abuja Municipal Area Council made up of 38,712 upper basic students. Simple random sampling was used to select 160 students from two different schools. A quasi-experimental design was adopted for the study which comprised one experimental group and a control group. Algebra Interest Questionnaire was used for data collection. The instrument was validated by two mathematics educators and one expert in measurement and evaluation for both face and content validation. Cronbach Alpha formula was used to estimate the reliability of the instrument and the index was found to be 0.71. Mean and Standard deviation were used to answer research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses formulated at 0.05 level of significance. The study revealed that students taught algebra using group algebraic blocks strategy showed interest more than those taught using conventional method. It also revealed that both female and male students did not show equal interest in group algebraic blocks strategy. It was recommended among others that teachers should adopt group algebraic blocks strategy in teaching algebra aspect of mathematics in upper basic schools.

Keywords: Interest, Group, Algebraic blocks, gender, upper basic

Introduction

Mathematics is relevant to everyday life and can be seen as the pivot on which all other subject revolve. Its study is generally considered as pre-requisite for the preparation of every informed citizen and serves as a gateway into numerous career choices in life. This may be why Okafor (2011) mentions that everybody uses mathematics in one way or the other in solving life problems. The growth and development of every country depends mainly on its technological advancement. Modern day's science and technological breakthrough is built upon mathematics. In line with this, Okafor (2011) believes that mathematics education worldwide has been regarded as a pre-requisite for scientific and technological development. Nations that desire to forge ahead scientifically and technologically cannot afford to toy with the mathematical knowledge of her citizenry (Iji, Ogbole & Uka, 2014).

The instructional methods and strategies used in the teaching and learning of mathematics is vital, as these constitute what and how mathematics could be taught in schools.

Instructional strategies adopted by the teacher could influence the affective, psychomotor and cognitive outcome of the learner. Many teachers do not use teaching methods and teaching aids that can stimulate students' interest. In most of Nigeria classroom, mathematics is hardly related to real life situation even when it is obvious to do so with little or no effort. Iji, Ogbole and Uka (2014) claim that many teachers use only the teaching method they know even if the method is not relevant to the concept under discussion and this to a great extent has affected the teaching and learning of algebraic concepts. Algebra aspect of mathematics uses letters to represent number and so students see it as a difficult part of mathematics.

Algebraic blocks are concrete mathematical aids which have existed in a variety of forms for some considerable time which can be used individually in mathematics class to make concrete model of abstract mathematical ideas (Ojo & Ojo 2011). Group algebraic blocks strategy is the learning strategy in which students manipulate the blocks together on learning tasks with the goal of all participants benefiting from interaction, (Oloyede, Adebowale & Ojo 2012). Psychologist and Educationist agree that most young children acquire problem solving skills and hence think more mathematically about mathematical concepts in the company of more advanced users of the concepts. In group algebraic blocks learning, the teacher structures the classroom tasks in such a way that students are made to work in groups. Students in group algebraic blocks manipulate, interact with one another, share ideas and information, seek additional information and make decision about their results (Nastaran, 2017). In group algebraic blocks, students are concerned about performance of all the group members. Also the focus moves from teacher-centered to student-centered education. Instead of sitting in a conventional or reading text, students are given tasks or problems in algebra and are asked to identify possible solutions on their own and with the help of others using the algebraic blocks. Rather than disseminating information directly, the teacher guides students to the source of information they may require thereby arousing their interest.

Interest is an important determinant for ones success in life. Students who are interested in their learning are likely to achieve better. Interest can be said to be a stimulus that increases the activity power of individual. It can also be referred to as the zeal or desire to achieve or perform or the feeling that one wants to know more about something. Idigo (2010) defines interest as the preparedness of or mastery of subject –matter background knowledge that can enable the learner to cope with further or higher learning of subject matter. Idigo maintains that teaching method is also a factor associated with mathematics interest. Any teaching strategy which takes interest of the students into consideration is likely to be successful because they will be interested in the learning. In line with this, Imoko and Agwagah (2006) observe that the use of manipulatives arouse interest in students due to curiosity. This curiosity characterized algebraic blocks where every learner must be fully involved in all fun- like, practical and interesting activities which may increase their interest in mathematics in general and algebra in particular. It has also been discovered that children with adequate materials and encouragement have shown greater interest in making things from their tools and materials during lessons. Educators should choose the kind of representations which support meaningful mathematics learning and arouse students' interest, since lack of interest affects male and female students' achievement in mathematics.

Gender as a variable has over the years, received considerable attention in many studies on science in general and mathematics achievement in particular. The issue of gender is currently a world trend and has remained an annual problem in mathematics achievement. Closing the gender gap in mathematics performance and having equality of outcome should be the utmost goal of every teacher (Cope, 2015). Therefore this work seek to teach algebra aspect

of mathematics using algebraic blocks to see if the gap between male and female interest could be closed.

Statement of the Problem

Nigerian secondary school students see mathematics as a difficult and abstract subject, probably because of algebra aspect of mathematics which uses letters to represent numbers. And so they have great difficulty in understanding, assimilating and retaining the mathematics concepts especially algebra taught to them in the classroom.. Consequently, this has led students into rote learning a number of algorithms without knowing why they are applying a particular algorithm. The resultant effect is lack of interest in mathematics. This lack of interest has also led to poor achievement in mathematics. Lack of interest has been of great concern to parents, teachers, students and the nation as a whole. If this lack of interest continues, the growth of the nation's economy will be highly affected since the students who are expected to use the mathematical Knowledge acquired, in national development processes will be inefficient. Therefore, the problem of this study is to find out the effect of group algebraic blocks strategy on students' interest in algebra.

Purpose of the Study

The main purpose of this study is to investigate the effect of group algebraic blocks on students' interest in algebra. Specifically, the study is set to:

1. Find out whether the use of group algebraic blocks strategy and conventional method to teach algebra enhanced upper basic students' interest in algebra.
2. Find out whether the use of group algebraic blocks strategy to teach algebra bridged the gap between upper basic male and female students' interest in algebra.

Research Questions

The following research questions were answered in the course of this study:

1. What are the mean interest ratings of students taught algebra using group algebraic blocks and conventional method?
2. What are the mean interest ratings of male and female students taught algebra using group algebraic blocks strategy?

Research Hypotheses

The following null hypotheses were tested at 0.05 levels of significance:

H0₁: There is no significant difference between the mean interest ratings of students taught algebra using group algebraic blocks and conventional method.

H0₂: There is no significant difference between the mean interest ratings of male and female students taught algebra using group algebraic blocks.

Methodology

The research design used for this study was a quasi-experimental design. Quasi experimental design is used when it is not possible to randomize individuals to treatment and control groups. The population of the study consisted all students in upper basic schools in Abuja municipal Area council for the year 2019/2020 session which according to Universal Basic Education Board is made up of 30,974 students. The sample size of 160 upper basic

students from two co-educational schools in Abuja Municipal Area Council was used for the study. Multistage sampling method was employed to draw the sample for the study. One intact class from each of the schools was used. One as experimental and the other as control group. The instrument used in the study for data collection was Algebra Interest Questionnaire (AIQ). It was prepared using Likert 4 point scale format. Cronbach Alpha formula was used to estimate the reliability of the instrument and the index were found to be 0.71. Data collected were analyzed using mean, standard deviation and ANCOVA.

Results

Research Question One: What are the mean interest ratings of students taught algebra using group algebraic blocks strategy and conventional method?

Table 1

Mean Scores and Standard Deviation in AIQ of Students in Group Algebraic Blocks Strategy and Conventional Method.

Teaching Method	No of Students	Type of Test	Mean	Standard Deviation
Group	78	Pre-interest	19.50	4.626
		Post-interest	26.90	5.194
Conventional method	82	Pre-interest	17.56	4.146
		Post-interest	18.54	4.409

Table 1 shows the mean scores and standard deviations of the students in the experimental and control groups. From Table 1 it could be seen that students taught using group strategy had mean scores of 19.50 and 26.90 in pre-interest and post-interest respectively, with standard deviation of 4.626 and 5.194 in pre-interest and post-interest. For students, who were taught using conventional method, their mean scores were 17.57 and 18.54 and standard deviation of 4.146 and 4.409 in pre-interest and post-interest respectively. Students taught with group algebraic blocks strategy had higher mean score than those taught with conventional method. The standard deviation scores for the pre interest and post interest were not at much variance implying that the efficacy of the treatment is sustainable.

Research Question Two: What are the mean interest ratings of male and female students taught algebra using group algebraic blocks strategy?

Table 2

The Mean Interest Ratings in AIQ of Male and Female Students in Group Algebraic Blocks Strategy.

Group	Gender	No of Students	Type of Test	Mean	Standard Deviation
GAB	Male	39	Pre-interest	21.45	5.23
			Post-interest	26.84	4.75
	Female	39	Pre-interest	17.65	3.02
			Post-interest	26.95	5.64

Table 2 shows the mean interest ratings and standard deviation in AIQ for male and female students in group strategy. The male students in group strategy had mean pre-interest rating of 21.45 and post-interest of 26.84 with standard deviation of 5.23 in pre-interest and 4.75 in post-interest while the female students had mean pre-interest ratings of 17.65 and mean post-interest ratings of 26.95 with standard deviation of 3.02 in pre-interest and 5.64 in post-interest. Female students taught using group strategy had mean interest ratings higher than the male students. The standard deviation scores for male and female in the group were not at much variance implying that the efficacy of the treatment is sustainable.

Hypothesis One: There is no significant difference between mean interest ratings of students taught algebra using group algebraic blocks strategy and conventional method.

Table 3

ANCOVA Results in AIQ for Group and Conventional Methods

Source	Type III sum of squares	df	Mean square	F	Sig	Remark
Corrected Model	5203.074a	2	173.358	143.697	0.000	S
Intercept	930.350	1	930.350	77.082	0.000	S
Group	1921.922	1	960.961	79.619	0.000	S
Pre-interest	2408.653	1	2408.653	199.564	0.000	S
Error	2763.930	157	12.070			
Total	127164.000	160				
Corrected Total	7967.004	158				

S = Significant at $P < 0.05$

Table 3 shows the summary of the one way Analysis of Covariance (ANCOVA) result on students' interest scores in AIQ. The result indicated that the noted difference between mean interest scores of the two groups is significant at 0.05 alpha levels. This is from the fact that $F_{(1,157)} = 79.619$ and $P = 0.000 < \alpha = 0.05$. The null hypothesis that there is no significant difference in the mean interest scores of students taught using group algebraic blocks strategy and conventional method was therefore rejected showing that significant difference exists.

Hypothesis Two: There is no significant difference between mean interest ratings of male and female students taught algebra using group algebraic blocks strategy.

Table 4

ANCOVA Results in AIQ for Male and Female Students in Group Algebraic Blocks

Source	Type III sum of squares	df	Mean square	F	Sig	Remark
Corrected Model	476.792 ^a	2	238.396	11.172	0.000	
Intercept	805.748	1	805.748	37.760	0.000	
GenderGAB	89.295	1	89.295	4.185	0.044	
Pre-interest	476.565	1	476.565	22.334	0.000	
Error	1600.388	75	21.339			
Total	58508.000	78				
Corrected Total	2077.179	77				

S = Significant at $P < 0.05$

Table 4 shows the ANCOVA results in AIQ for male and female students in group algebraic blocks strategy. Table 4 shows an F= ratio 4.19 with associated exact probability value of 0.044 which is less than the bench mark probability value of 0.05. This indicates that there was significant difference in the mean interest ratings of male and female students in group algebraic blocks strategy. The null hypothesis was therefore rejected which implies that difference exists.

Discussion

Findings from the analysis of data collected for this study revealed that students interest in algebra improved very well due to the use of group algebraic blocks strategy but improved little with the use of conventional method. This finding is line with Anigbo (2016) study which revealed that students' interest in mathematics depend on the teaching method used. The findings also agree with Ajai (2013) Study which found that students exposed to simulation show more interest than students exposed to conventional method.

The finding also reveals that there was significant difference in mean interest scores of students taught using group strategy and conventional method. This finding agree that students show greater interest when they learn in the company of others. Group strategy encourages positive interdependence as can be seen in Social interdependence theory. This finding is line with Oloye, Adebowale and Ojo (2012) study which revealed that students taught statistics using group strategy differ both in achievement and interest with those taught using Conventional method.

Also the findings of the study revealed female students showed more interest than the male students in algebra using group algebraic blocks strategy. This finding contradicts that of Nastaran (2017) who disclosed that male and female students taught using group strategy differ in interes and achievement in favour of the male students. Also this finding disagrees with that of Ajai (2013) who argued that interest and achievement in mathematics is a function of orientation not gender. The findings show that interest in algebraic processes depends on gender as well as on teaching method. As discussed earlier, teaching method could indeed affect interest in algebraic concepts. However, gender could also play important role irrespective of the teaching strategy used. Since the treatment was on both genders, it does not necessarily mean that a particular teaching strategy favors a particular gender. What it means

is that a particular gender can show interest in mathematical concepts more than the other which is in line with Rabab'h, Veloo, and Perumal (2015) studies which shows that female students show more interest than the male students. Also, the study is line with Salmiza, and Mohammed (2016) study on Students' achievement in algebra considering the Effect of gender which shows that significant main effect exist.

Conclusion

The findings of this study have shown that group algebraic blocks strategy has significant effect on students' interest more than conventional method. However these results imply that the learning approach which is mainly conventional employed by mathematics teachers in teaching might have been partly responsible for the persistent lack of interest in mathematics. The implications of this findings hinge on the development of better teaching strategies for teaching and learning of mathematics.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Mathematics teachers should adopt the use of group algebraic blocks strategy in teaching algebra aspect of mathematics in order to enhance students' interest in mathematics.
2. Mathematics teachers should use blocks as instructional material while teaching some abstract topics like algebra to enhance students' interest and achievement in mathematics.
3. Curriculum planners should include group algebraic blocks strategy as a strategy for teaching algebra topics when planning mathematics curriculum.

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