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EFFECT OF ADVANCE ORGANIZERS INSTRUCTIONAL STRATEGY ON UPPER BASIC THREE (3) STUDENTS' INTEREST IN ALGEBRA IN MAKURDI METROPOLIS OF BENUE STATE, NIGERIA

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ABSTRACT

This study investigated the effect of Advance Organizers instructional strategy on upper basic three (3) students' Interest in Algebra in Makurdi metropolis of Benue state, Nigeria. A pre-test post-test control group quasi-experimental design. Simple random sampling technique and purposive sampling were adopted. The sample comprised 364 out of 12,675 upper basic three (3) students in Government approved schools in Makurdi metropolis of Benue state. Three research questions and corresponding three hypotheses were formulated to guide this study. One research instrument was used for this study, namely; Algebra Interest Inventory (AII). The Algebra Interest Inventory was duly validated by two experts in Mathematics Education Department, one expert in Educational Foundation and General Studies both of Joseph Sarwuan Tarka University, Makurdi. The reliability coefficients of Algebra Interest Inventory (AII) 0.96 using Cronbach's Alpha coefficient. The research questions were answered using the mean and standard deviation and the research hypotheses were tested at 0.05 level of significance using the analysis of covariance (ANCOVA). The results of the study revealed that the students in the experimental group had mean interest ratings higher than those in the control group.

INTRODUCTION

Nation that plan to become scientifically and technologically developed cannot do without the acquisition of the requisite mathematics knowledge; such nation must have in her barn the

producers and consumers of mathematical knowledge (Macalalag, Sahin, Johnson, & Bicer, 2022).

It is believed that without mathematics, no modern technology can exist, which is why mathematics is made a compulsory subject in Nigerian primary and secondary schools (NPE, 2014). Thus, Mathematics is supposed to aid in the acceleration of every society's social, economic, and technical growth. However, in the end, these are dependent on successful mathematics teaching and learning in schools.

Algebra is a subset of mathematics that uses letters rather than numbers to solve problems. Algebra, as a key to mathematics, is one of the subjects in which students fail the most (Usman & Musa, 2019**).** For students to understand and possess the mathematical skills of problem solving, communication, reasoning and making connections that are necessary in human daily living they need algebra (Egara, Nzeadibe & Okeke 2020).This is so, because algebra is the language through which most of the mathematics is communicated. Algebra according to Usman and Musa, (2015) is an aspect of mathematics which involves the use of letter and numbers. These letters combine with figures bring a lot of confusion to the students more so, with the letters changing values or one letter replacing another letter at intervals. Although, algebra is considered as one of the most significant aspect of school mathematics; it does not only play an important role in mathematics but function as a doorkeeper to future educational and employment opportunities (Silver, cited by Egara, Nzeadibe & Okeke 2020). Nonetheless, Stewart and Reeder (2017) noted that improving students learning needs the use of evidence based instructional strategies such as advance organizers. Teachers are expected to have deep understanding of the content knowledge of algebraic concepts and features of involvements in the teaching learning of algebra and providing opportunities for prospective mathematics teachers and their educators to better understand challenges in learning mathematics courses helps inform classroom instruction and become successful irrespective of the scope of the intervention (Cousins-Cooper, Staley, Kim, & Luke, 2017; Lee, Bryant,. ., & Shin, 2020).

The primary purpose of teaching at any level of education according to Awodun and Boris (2021) is to bring a fundamental change in the learner. `To facilitate the process of knowledge transmission, teachers should apply appropriate teaching strategies that best suit specific objectives. In the traditional epoch, many teaching practitioners widely applied teacher-centered method to impart knowledge to learners other than student-centered

methods. Until today, questions about the effectiveness of teaching methods on students learning have consistently raised considerable interest in the mathematics fields of educational research (Oyeniyi, 2019).

Students' interest according to Age, Iji, Abakpa and Anyagh (2021) is one of the major factors that influence students' learning and achievement. Azmidar, Darhim and Dahlan (2017) define interest as the preference in some ones' soul together with happiness. Interest does not appear spontaneously, but it is turned up through participation, experience and habit when studying or working. Shabani in Khayati and Payan (2014) state that interest is a stimulus that increases the activity of power. Simultaneous to active learning, students should be interested in the subject they are learning and student may resort to it in order to understand the materials and apply them appropriately. More so, the failure of students in Mathematics achievement was also supported by some researchers to be associated with lack of interest in studying the subject (Tembe, Anyagh & Abakpa 2020; Azmidar, Darhim & Dahlan 2017).

To achieve the desired objectives, according to Johnson and Amadi, (2020) government in developing countries of which Nigeria is one, has made substantial investments on both manpower, learning materials and infrastructure on mathematics education at both junior, secondary and tertiary levels on their educational system. Despite all this substantial investment on mathematics education, there is an increasing rate in the poor achievement of students in mathematics examination in Basic Education Certificate Examination (BECE, 2017). It is generally believed that the cause of this poor performance of students in mathematics is attributed to the fact that mathematics is abstract and difficult. According to Anyagh, Agbo-Egwu and Kalu (2018), the issue of how best to help the learners acquire knowledge, skills and values has been a problem to educationists over the years. In attempting to provide answers to this problem, educational scholars put forward different strategies, practices, methods or approaches of teaching. The National Policy on Education (NPE, 2024) in Nigeria also emphasizes effective teaching and learning of mathematics with the use of a lot of strategies. Effective teachers give their students opportunities to use an ever increasing array of representations—and opportunities to translate between them. For example, a student working with different representations of functions (real-life scenarios, graphs, tables, and equations) has different ways of looking at and thinking about relationships between variables. (Anyagh et al, 2018). Kaur (2019) also noted that teachers

need to employ different learning methods and strategies to ensure students understanding of scientific concepts. Adopting proper teaching strategies like the utilization of advance organizers may help teachers in solving learners' problems and bring remarkable improvement in their overall behavior.

Quite remarkably, regular poor academic achievement by the majority students is fundamentally linked to application of ineffective teaching methods by teachers to impact knowledge to learners (Elvis, 2013). Also, Adekali (2023), noted that teachers' use of inappropriate teaching methods such as lecture method in teaching is one of the leading causes of students' poor achievement in science. Adekali further expatiate that the lecture method entails one way flow of communication from the teacher to the students and it is teacher - centered approach where by most of the talking is carried out by the teacher while the students remain passive listeners taking notes, thereby denying the students the opportunity to develop the required manipulative skills needed in learning science.

The ultimate goal for all teachers is to provide equal opportunities for every student (male or female) in the classroom. This makes gender an important variable in the school system, and crucial for educators and researchers to pay attention to gender differences in the design of mathematics instruction. Gender refers to the condition of being male or female, masculine or feminine. Gender according to Akissani, Muntari and Ahmed (2019) describes the personality traits, attitudes, behaviours, values, relative power, influence, roles and expectation that society ascribes to the two sexes (male and female) on a differential basis. Gender is a major factor that influences career choice and subject interest of students. Thus, in schools, males are more likely to take difficult subject areas like mathematics while the females take to different subject areas that will not conflict with marriage chances, marriage responsibilities and motherhood (Akissani, Muntari and Ahmed 2019). Unfortunately, Omeodu and Fredrick, (2019) stated that some teachers encourage gender stereotype by giving different treatment to males and females in classroom. In the home, it is common belief and practice that responsibilities are assigned differently to males and females; the society frown at seeing a male cooking or a female climbing a tree. The males are also assigned leadership positions and the females are to assist or to follow. However, it is expected that the learning experiences offered to students in schools should not discriminate against males and females. According to Iroko and Olaoye (2021), gender studies are popular in algebra as a branch of mathematics. It is expected that the educational experience given to

students in schools does not discriminate between men and women. It is also important to ensure that male and female students have equal access to mathematics education. There is the need to see to it that both male and female students are given equal access to education especially in mathematics. This could be achieved through the use of instructional strategy like advance organizers being investigated in this study.

Advance organizers have been proposed as a model in which students learning occurs at the three levels of educational domains (cognitive, affective and psychomotor). Blooms taxonomy is a hierarchical ordering of cognitive skills that can, among countless other uses, help teachers teach and students to learn (Johnson & Amadi, 2020). An advance organizer is a kind of cognitive bridge, which teachers use to help learners make a link between what they know and what is to be learnt. An advance organizers can be defined as a visual and graphic display that depicts the relationships between facts, terms, and ideas within a learning task. Advance organizers are also referred to as knowledge maps, concept maps, story maps, cognitive organizers, or concept diagrams (Adel, in Mostafa 2017). Advance organizers have multiple benefits. These benefits include helping learners grasp the material by assisting in seeing the relationships between ideas, concepts, or authors. Advance organizers also assist in memory recall. More so, advance organizers encourage the use of developing higher-level thinking skills by assisting students to synthesize and integrate information, ideas, and concepts. Advance organizers are teaching and learning tools that show organization of concepts as well as relationships between them into a visual format.

Statement of the Problem

Mass failure in mathematics at Basic Education Certificate Examination level has been a matter of serious concern to every stakeholder in the education system. Various reasons have been adduced for this. Among these reasons are the teaching strategies used by mathematics teachers. However, advance organizers has been proposed as a model in which students learning occurs at the three level of educational domains (cognitive, affective and psychomotor), thus enhancing better interest and achievement by students. This model (advance organizers) has not been widely tested in teaching of mathematics in some parts of Nigeria. Hence, this study seeks to find out if adopting advance organizers as an instructional strategy will help improve upper basic three students' interest and achievement in algebra.

One of the objectives of Basic Education in Nigeria is to provide a child with diverse basic knowledge and skills for entrepreneurship and educational advancement (NPE, 2014). The

rate of failure in Basic Education Certificate Examination (BECE, 2017) in mathematics is an indication that this objective has not been achieved. The Basic education certificate examination chief examiner's report (2017) indicates that in spite of the seeming improvement of candidates' achievement in mathematics, candidates show weakness in algebra as compared to other concepts of the subject and thus suggested that mathematics teachers as well as students be encouraged to put in more efforts in teaching and learning of algebra. Mathematics educators have put in more efforts aimed at identifying the major problems associated with poor achievement in mathematics. Despite all the efforts, the poor achievement of students in mathematics has continued unabated. Could it be that the students low interest and could not remember what they have learnt previously and hence poor achievement? Could this abysmal underachievement be that wrong teaching strategies are used by teachers of mathematics? In search of effective strategy for the teaching and learning of algebraic concepts, the NPE emphasized the use of instructional strategies that will enhance effective teaching and learning of mathematics.

Though a lot of researches have been conducted on students' achievement in algebra using tools, computer algebraic system (CAS) and a host of others, the problem of poor achievement in algebra still persist. Could it be that the aforementioned tools and software do not enhance students' achievement in algebra? The problem of this study therefore seeks to find out if adopting advance organizers as an instructional strategy will help improve upper basic three students' interest in algebra. It is also to ascertain whether gender increased in their interest and achievement in algebra during the period of this study.

Objective of the study

The purpose of this study was to determine the effect of advance organizers on upper basic three students' interest in algebra in Makurdi metropolis, Benue state, Nigeria. Specifically, this study is set to:

1. determine whether the use of advance organizers as instructional strategy will have effect on upper basic three students' interest in algebra.
2. find out the Ascertain the interest of male and female upper basic three students taught algebra with Advance Organizers Strategy (AOS) during the period of conduct of this study.
3. interaction effect of gender and methods on upper basic three students' interest in algebra during the period of the conduct of this study.

Research Questions

The study was guided by the following research questions:

1. What is the mean interest scores of upper basic three students taught algebra using Advance Organizers Strategy (AOS) and those taught using Traditional Method (TM)?
2. What are the mean interest scores of male and female upper basic three students taught algebra with Advance Organizers Strategy (AOS) during the period of conduct of this study?
3. What is the interaction effect of gender and methods on upper basic three students' interest in algebra during the period of the conduct of this study?

Statement of Hypotheses

The following hypotheses was formulated and tested at 0.05 level of significance

1. There is no significance difference in the mean interest scores of upper basic three students taught algebra using Advance Organizers Strategy (AOS) and those taught using Traditional Method (TM).
2. There is no significant difference in the mean interest scores of male and female upper basic three students taught algebra with Advance Organizers Strategy (AOS) during the period of this study.
3. There is no significant difference in the interaction effect of gender and methods on upper basic three students' interest in algebra during the period of the conduct of this study.

METHODOLOGY

In this section, the method and procedures adopted for conducting this study are discussed under the following headings; research design, area of the study, population of the study, Sample and sampling techniques; Instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection, data analysis techniques.

RESEARCH DESIGN

This study adopted quasi-experimental pretest-posttest control group design. This design was adopted because it was suitable for use in an educational setting like secondary school where the researcher often does not have control over all the variables under true experimental condition. Secondly, the design was adopted because it establishes cause-and-effect relationship between independent and dependent variable in which case subjects could be

assigned to groups based on non-random criteria. The pretest-posttest design can be diagramed as follows:

Groups	Pre-test	X	Posttest
C	O_{11}		O_{12}
E	O_{21}		O_{22}

Where C= Control group

E=Experimental group

O_{11}= pretest for control group

O_{12}= posttest for control group

O_{21}= pretest for experimental group

O_{22}= posttest for experimental group

X = Treatment/independent variable(Advance Organizers Strategy)

The study was conducted in Makurdi Metropolis. Makurdi is the Benue state headquarters and a Local Government Area in the state. The Local Government was created in 1976 when Benue state was created. Makurdi, the state capital was established in the early twenties and gained prominence in 1927 when it became the headquarters of the then Benue province.

The population of the study was 12, 675 Upper Basic Education three (UBE 3) students derived from 170 secondary schools in Makurdi Metropolis (Makurdi Area Education Office, 2022), see appendix I. This set of students were considered for this study because of the rate of failure in Basic Education Certificate Examination in mathematics (BECE, 2017). Students in this class show weakness in mathematics and particularly in algebra, this is in line with the chief examiner's reports. It is also a transitional class that takes the students to the senior secondary school and their knowledge of mathematics at this level is fundamental to the next level of education.

The sample for this study was 364 Upper Basic Education three (UBE3) students drawn from a population of 12, 675 students from 170 secondary schools in Makurdi, Benue state. Four schools were selected out of the 170 secondary schools in Makurdi Metropolis. Two different sampling techniques were used at different stage of the study. The sampling techniques were (i) Simple random sampling (ii) purposive sampling technique.

Simple random sampling was used to assign schools to experimental and control groups. The simple random sampling was adopted because, here participants have an equal and fair

chance of being selected. As the selection method used gives every participant a fair chance, the resulting sample is unbiased and unaffected by the research team. The procedure simply involves creating a list of all the schools, assigning each a number, and then randomly selecting a subset using a random number generator or a lottery method.

The schools were selected based on the following criteria (i) schools with basic education examination centres (ii) schools where the mathematics teachers are professionals as such it would be easier to train research assistants (iii) mixed schools (males and females). Based on these reasons, purposive sampling was adopted. The sample comprised 196 students for experimental group (male=102 and female=94) and 168 students for control group (male=79 and female=89).

Table 1: Students in Control and Experimental Groups

Group	Males	Females	Total
Control	79	89	**168**
Experimental	102	94	**196**
Total	**181**	**183**	**364**

One instrument was used for data collection. Algebra Interest Inventory (AII).
The Algebra Interest Inventory (AII) was developed by the researcher which contain twenty four (24) items aimed at eliciting responses from the students in mathematics. This is aimed at measuring students' interest in Algebra. It was a four point's scale namely: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) weighed as 4,3,2,1 respectively for positive statements and 1,2,3,4 for negative statements with 2.5 decision value.

The instrument was validated by one expert in measurement and evaluation and two experts in mathematics education both in Joseph Sarwuan Tarka University, Makurdi. Two experienced mathematics teachers at secondary school level in Makurdi metropolis to ensure appropriateness of the items to measure what they are designed to measure in terms of content validity, scope and relevance. Some of the items were restructured to suit the purpose they were made to serve.

The instruments were administered to the Upper Basic three (3) students in Makurdi Local Government Area but in a school different from the schools selected for the study. A trial testing of the Algebra Interest Inventory (AII) was conducted using 40 students of UBE

Tyodugh a co-educational school situated along Joseph Sarwuan Tarka University Makurdi-Gbajimba road. The scores collected from the administered instrument AII were subjected to reliability test using the Kuder-Richardson's formula K- R 21 and Cronbach's Alpha with the coefficient of reliability found to be 0.87 and 0.96 respectively. These indices suggested that the instruments were found to be reliable (see appendix H) The reason for K-R 21 is that it is easier to calculate, as it doesn't require item-level data or proportion of correct responses. Secondly, K-R21 is used with less detailed data, making it suitable for situation where item-level information isn't available. Lastly, it provides a quicker estimate of reliability, which can be beneficial for large data sets or time-sensitive research. If the instrument has the same or homogeneous level of difficulty for each question item then use the KR-21 formula to test its reliability (Cho & Chun, 2018; Ekolu & Quainoo, 2019; Foster, 2021; Yusup, 2018).

The researcher with the help of four (4) research assistants administered the pre- AII to Upper Basic Three (3) students in the two groups at the same time. This was to avoid the students discussing the test items. The researcher sought authorization from the principals of the selected schools after which mathematics teachers were chosen to serve as research assistants for this study in the schools.

Data collected for the study was subjected to descriptive and inferential statistics. Research questions 1-4 were answered using mean and standard deviation. Question five and six were answered using scatterplot. Any item with mean rating of 2.5 and above was considered accepted but any item with mean rating below 2.5 was not accepted. The choice of using mean was because its easily gives average information on both the experimental and control groups. The purpose of the scatterplot was to provide a general illustration of the relationship between the two variables i.e gender and methods. The hypotheses were tested using Analysis of Covariance ANCOVA at 0.05 level of significance. The choice of ANCOVA was to take care of the covariates and to control differences across the groups and to test the significance of differences among means after taking into account or control initial mean difference between experimental groups on so-called covariates, that is, a variable that is correlated with the dependent variable.

RESULTS AND DISCUSSION

This section deals with test analysis of Covariance (ANCOVA) assumptions, data presentations, statistical analysis of data collected as well as relevant interpretations based on

research questions and the tested hypotheses, summary of major findings and discussions of findings.

RESULTS

The results are presented according to research questions with their corresponding hypotheses.

Research question 1

What are the mean interest ratings of upper basic three students taught algebra using Advance Organizers Strategy (AOS) and those taught using traditional method?

The data for the mean interest ratings for this question are presented in table 2.

Table 2:Means and Standard Deviations of Interest Ratings of Experimental and Control Groups

Groups	**N**	**Pre-AII Mean ($\bar{x}$)**	**SD**	**Post-AII Mean ($\bar{x}$)**	**SD**	**($\bar{x}$) Gain**
Experimental	196	1.61	0.58	3.64	1.31	2.03
Control	168	1.62	0.59	3.62	1.32	2.00
Mean Difference		**- 0.01**		**0.02**		**0.03**
Total	364					

Table 2 shows that, the mean pre-test algebra interest ratings of the experimental group was 1.61 with a standard deviation of 0.58 while the control group had a mean pre-test interest rating of 1.62 with a standard deviation of 0.59. After undergoing algebra lessons using Advance organizers, the mean post-test algebra interest rating of the experimental group was 3.64 with a standard deviation of 1.31 while the control group was 3.62 with a standard deviation of 1.32. The table further shows that the mean gain for advance organizers strategy was 2.03 and conventional method 2.00 in favour of advance organizers strategy. Also, the mean interest ratings of the experimental group was higher than that of the control group by Advance Organizers rating of 0.03 after treatment.

Research Hypothesis 1

There is no significant difference between the mean interest ratings of upper basic three students taught algebra with advance organizers strategy (AOS) and those taught using traditional method (TM). The test of this hypothesis is shown in table 3

Table 3:Ancova Results of Interest Ratings of Upper Basic Three (3) Students taught Algebra with Advance Organizers and those taught with Conventional Methods

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	21.819[a]	2	10.910	18.016	.000	.091
Intercept	32.596	1	32.596	53.830	.000	.130
PreAII	20.500	1	20.500	33.854	.000	.086
Group	**1.164**	**1**	**1.164**	**1.922**	**.167**	**.005**
Error	218.599	361	.606			
Total	1794.000	364				
Corrected Total	240.418	363				

R Squared = .091 (Adjusted R Squared = .086)

Table 3 shows ANCOVA value P= 0.167 > 0.05. Thus, the null hypothesis is not rejected. This means that there is no significant difference between the mean interest ratings of upper basic three students taught algebra with advance organizers strategy (AOS) and those taught using traditional method**.**

Research Question 2

What are the mean interest scores of male and female upper basic three students taught algebra with advance organizers strategy (AOS) during the period of conduct of this study? The test result of this question is shown in Table 4.

Table 4:Means and Standard Deviations of Interest ratings of Male and Female Students taught Algebra using Advance organizers

Groups	N	Pre-AII Mean ($\bar{x}$)	SD	Post-AII Mean ($\bar{x}$)	SD	($\bar{x}$) Gain
Male `	102	1.68	0.52	2.55	0.95	0.87
Female	94	1.63	0.64	2.54	0.64	0.91
Mean Difference		**0.05**		**0.01**		**-0.04**
Total	196					

Table 4 shows that, the mean pre-interest ratings of male students in experimental group was 1.68 with standard deviation of 0.52, while the mean interest ratings of the female students was 1.63 with a standard deviation of 0.64. The mean post-interest ratings of male students was 2.55 with gstandard deviation of 0.95, while the female students mean interest rating was 2.54 with standard deviation of 0.64. The male and female students mean pre-interest rating difference was 0.05 whereas their mean post interest rating difference was 0.01. The mean difference of male and female students in the experimental group was -0.04. This is an indication that the female students improved more than the male on their interest.

Research Hypothesis 2

There is no significant difference in the mean interest scores of male and female upper basic three students taught algebra with advance organizers (AOS) during the period of this study. The answer to this hypothesis is shown in table 5.

Table 5:ANCOVA Results of Algebra Interest ratings of Upper Basic three (3) Male and Female Students taught Algebra with Advance Organizers

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	878.452[a]	2	33.787	1.342	.138	.171
Intercept	20267.392	1	20267.392	804.873	.000	.826
PreAII	274.770	1	18.l318	.727	.754	.061
Gender	**18.348**	**1**	**18.348**	**.729**	**.395**	**.004**
Error	4255.563	163	23.181			
Total	81113.000	196				

Corrected Total	5134.015	195

a. R Squared = .171 (Adjusted R Squared = .044)

In Table 5, the ANCOVA value P=0.136>0.05 level of significance. Thus, the null hypothesis not rejected. This indicates that there is no significant difference between mean interest ratings of male and female students taught algebra using Advance Organizers as measured in AII.

Research Question 3

What is the interaction effect of Advance Organizers Strategy (AOS) and gender on upper basic three students' interest in algebra?

Linearity Scatter Gram for Male and Female students of Experimental Group in Algebra Interest Inventory (AII)

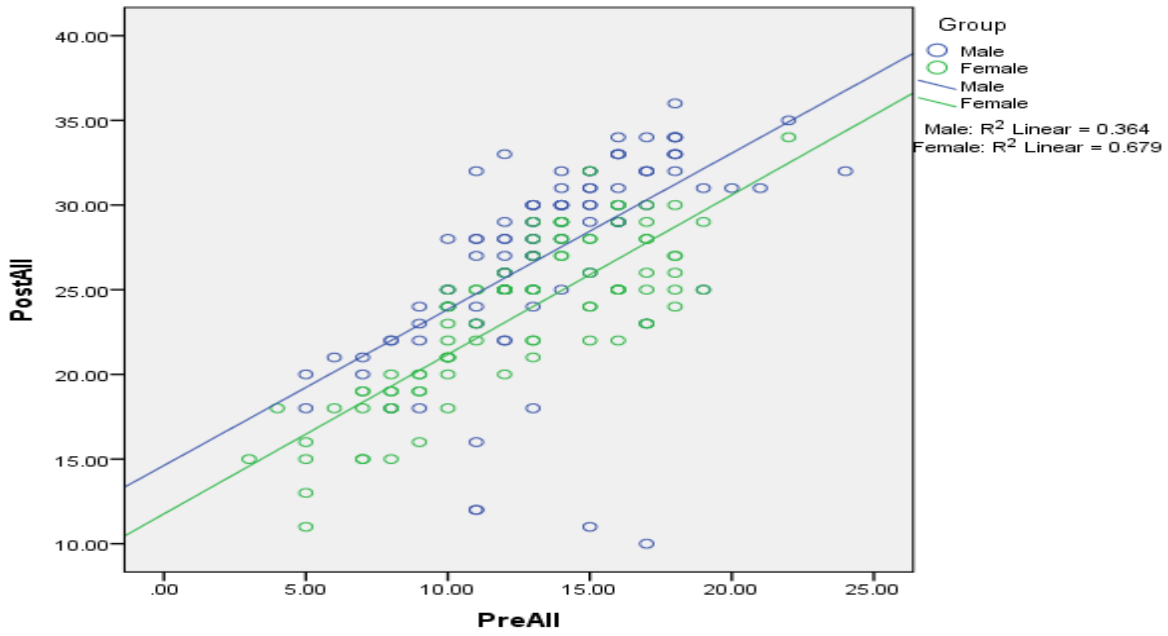

Fig ire 1: Interaction Effect of gender and methods on students' interest in Algebra

Figure 1 shows that there is a positive linear relationship in the interest ratings of male and female Upper Basic three students in learning algebra using methods. In the scatter plot, the two lines representing the male and female variables of gender are both parallel to each other, and they both rise on y-axis to the top right of the x-axis. Their R-square or the coefficient of determination, variance explained, the squared correlation (as it is called) have such values as R^2 linear = 0.364 x 100 = 36% variance explained for female and R^2 linear = 0.679 x 100 =

68% variance explained for male students. The parallel lines are indications that there is no interaction effect of gender and methods on students' interest in learning algebra. In other words, it is an indication that Upper Basic three students' interest in learning algebra using methods is not dependent on gender.

Research Hypothesis 3

There is no significant interaction effect of gender and methods on Upper Basic three students' interest in algebra.

The test result is shown in Table 6.

Table 6 Summary of Analysis of Covariance of Interaction Effect of gender and methods on students' Interest in Algebra Interest Inventory (AII)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11633.366[a]	3	3877.789	26.424	.000	.180
Intercept	9399.068	1	9399.068	64.046	.000	.151
Method	11600.613	1	11600.613	79.048	.000	.180
Gender	13.616	1	13.616	.093	.761	.000
Method* Gender	.023	1	.023	.000	.990	.000
Error	52831.744	360	146.755			
Total	833034.000	364				
Corrected Total	64465.110	363				

a. R Squared = .180 (Adjusted R Squared = .174)

From Table 6, it is observed that the significance values of method variable is (0.000) less than the threshold value (0.05), while that of gender variable is (p0.761) more than the threshold value (0.05). Also, the interaction between the two factors Method*Gender (0.990) is more than the threshold value (0.05). That is F(1, 360) = 0.02, P = 0.990 > 0.05, $\square^2_{partial}$ = 0.00. The $\square^2_{partial}$ = 0.00 shows 0% variance explained, in other words it shows a small ***d***-value (according to Cohen, 1988) or near absent interaction effect. Thus, we do not reject the null hypothesis. It implies that there is no significant interaction effect of gender and methods on students' interest in algebra.

Summary of major Findings

The major findings were based on the data presented in this study

1. The difference between mean interest ratings of students taught Algebra using Advance Organizers and those that were taught using Traditional Methods during the period of study was statistically significant.
2. The difference in the mean interest rating scores of male and female upper basic three students in the experimental group was not statistically significant.
3. The interaction effect of gender and Advance Organizers on Upper Basic three(3) student's interest in Algebra was not statistically significant.

Discussion of Findings

This study assessed the efficacy of Advance Organizers Strategy on upper basic three (3) student's interest in algebra. The findings were discussed as shown.

Results from table 2 revealed that there is significant difference in the mean interest ratings of students taught algebra using advance organizers strategy and those taught algebra with conventional methods. This finding is in agreement with Bulus and Mshelia (2021) who carried out a similar research that investigated the Effect of Graphic-Advance-Organizers, they found out that there was improvement in the students' interest towards mathematics and Graphic-Advance-Organizers has the potential of enhancing Junior Secondary School Student's Interest and Performances. Also, the result of the findings agrees with Egara, and Nzeadibe (2018) who carried out a study aimed to examine the effect of using computer simulation on students' interest in algebra. The result showed that there was a higher mean interest ratings for students taught with computer simulation compared to students taught with the conventional approach. Also, the first hypothesis determined whether there existed a significant difference in the mean interest ratings of students taught algebra utilizing the computer simulation approach and their counterparts taught the same topics using the conventional approach.

Result from table 4 indicates that both male and female students who were taught algebra using advance organizers improved on their interest, that there was no significant difference in their interest ratings. This result is similar to Enekwe (2016) who investigated the use of advance organizers strategies on students' interest, the finding indicated that gender did not significantly influence the interest of the students.

Figure 1 shows that there is a positive linear relationship in the interest ratings of male and female Upper Basic three students in learning algebra using Advance Organizer strategy (AOS). In the scatter plot, the two lines representing the male and female variables of gender are both parallel to each other, and they both rise on y-axis to the top right of the x-axis. The parallel lines are indications that there is no interaction effect of Advance Organizers strategy and gender on students' interest in learning algebra. In summary, it is an indication that Upper Basic three students' interest in learning algebra using Advance Organizer strategy is not dependent on gender. Also From table 9, it is observed that the significance values of method variable is (0.000) less than the threshold value (0.05), while that of gender variable is (0.761) more than the threshold value (0.05). Also, the interaction between the two factors Method*Gender (0.997) is more than the threshold value (0.05). That is F(1, 360) = 0.02, P = 0.997 > 0.05, $\square^2_{partial}$ = 0.00. The $\square^2_{partial}$ = 0.00 shows 0% variance explained, in other words it shows a small ***d***-value (according to Cohen, 1988) or near absent interaction effect. Thus, we do not reject the null hypothesis. It implies that there is no significant interaction effect of gender and methods on students' interest in algebra. The finding of this study is in agreement with Age etal (2021) whose study indicated no interaction effect of gender and students interest in geometry.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This section presents the summary, conclusion drawn from this study and the recommendations based on the findings of the study. The implications of the study and suggestions for further research are also highlighted in this section.

Summary

The purpose of this study was to determine the efficacy of Advance Organizers on upper basic three interest in algebra. The findings of this study among others could be of benefit to curriculum planners, mathematics teachers, students, school proprietors and educational researchers. The content of the study was factorization of algebraic expressions, factorization of quadratic expressions, simple equations involving fractions, and simple linear equations.

CONCLUSION

Based on the result of the study, it was concluded that: the interest of the upper basic three students taught algebra using Advance Organizers improved. Also the interest of both male and female upper basic three students taught algebra using Advance Organizers improved

more than those taught without Advance Organizers. However, there is no interaction effect of Advance Organizers and gender on upper basic three students as measured by AII.

Recommendations

The following recommendations were made based on the findings of the study:

1. Mathematics Teachers should always use Advance organizers in teaching algebraic concepts to students to aid their interest in learning.
2. The school authorities should provide the necessary materials for the mathematics teachers to construct Advance organizers that suit every concept to be taught in mathematics.
3. Nigerian Educational Research and Development Council (NERDC) should incorporate advance organizers into the curriculum so that mathematics teachers will see this a necessary for achieving class room objectives.
4. Mathematics Teachers Association, National Mathematics Centre and other relevant stakeholders should organize conferences and workshops where this new innovation will be introduced to mathematics teachers.

Limitations of the Study

The following was the limitation of the study.

1. Some of the students in the sampled schools were not on ground in the first week of the experiment, the researcher had to wait until the classes were complete for the exercise.

Suggestions for Further studies

Further research can be done in the following areas

1. Similar study can be replicated in other parts of the country
2. Effect of Advance Organizers as an instructional Strategy on upper basic three student's interest and achievement in other concepts in mathematics

Contribution to Knowledge

Based on the findings of the study, it was established that:

1. The result of this study showed empirically that the use of advance organizers was more effective as an instructional strategy in teaching upper basic three students algebra than conventional methods with no gender difference as indicated quantitatively (0.133>0.005).
2. The study also showed that complexity in solving algebraic problems could be overcome with no effect of gender and advance organizers strategy($p=0.000<0.05$ level of significance).

3. The study has revealed new strategy teaching algebra at upper basic three students which could yield more positive results.

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