INFLUENCE OF ADVANCE ORGANIZERS ON STUDENTS' INTEREST IN MATHEMATICS IN MAIDUGURI ZONAL EDUCATION OF BORNO STATE, NIGERIA

Alhaji Modu Bukar
alhajimodubukar@gmail.com
Tel: +2347063232444, +2348927927062
Department of Mathematics,
Umar Ibn Ibrahim El-Kanemi College of Education,
Science and Technology (UIIECEST),
Bama, Borno State, Nigeria

Abstract
The study explores on the influence of advance organizer strategy on students' interest in mathematics in Maiduguri zonal education of Borno State with two guided objectives, two research questions and two formulated hypotheses. The study design used experimental research design involving two intact classes (one experimental and one control group). The target population of the study was 19 secondary schools with the total population of 65,628 students, 30,628 male and 35,000 female. The sampled were two schools random selected with two intact classes (Experimental and control). The instrument used for data collection was questionnaire titled; Mathematics Interest Questionnaire (MIQ) and it was validated then pilot tested and its reliabilities index was calculated using PPMC to obtained 0.91. The data collected through administering the MI-questionnaire to the respondents and the data collected were analyzed using the U-test at alpha (α) = 0.05 level of significance. The result revealed that, there was statistical significant difference in students' level of interest in mathematics and the practical significant highlighting the influence of teaching mathematics with advance organizer and there is no significant difference in students' level of interest between male and female. The study has significantly contributed and highlights the prospective usefulness of Advance Organizer in enhancing students' interest in learning Mathematical concepts and recommends that, the mathematics teachers should frequently use the Advance Organizers in teaching Mathematics to attract the mine of learners towards the subject.

Keywords: Advance Organizer, Interest in Mathematics, U-test

Introduction
Education remains the overall sector to handled teaching and learning properly. The primary purpose of teaching at any level of education is to bring a fundamental transformation in the learners by applying appropriate teaching methods that best suit the objectives and learning outcomes. In the traditional era, many teachers use teacher-centered method to impart knowledge instead of student-centered method (Oyeniyi, 2019). According to Elvis (2020) how to learn is equally important with what to learn, but how to teach is more important than what to teach, because, teaching make a difference due to the method of teaching adopted. Thus, this research focused on influence of Advance Organizers in teaching mathematics.

The advance of organizer is a teaching method that introduces central concept before a lesson to help students' link prior knowledge with new materials, enhancing understanding and retention (Elfeky *et al*., 2020). The strategy of using Advance Organizers in teaching as well as learning in education was advocated by Ausubel (1960) in his theory known as Sub-sumption model theory, which allows the learner to recall and transfer prior knowledge to the new information being presented. Mahdi *ed al*, (2020) in Mayor's (2003) cited that, an advance organizer helps to organize new material by outlining, arranging and sequencing the main idea of the new material based on what the learner already knows and this process helps to insert the new information into long term memory. There are two broad categories of advance organizers.

Expository organizers which are used whenever the new material is totally unfamiliar, comparative organizers which are used when the material to be learnt is not entirely new, many researchers were done on the advance organizers in different subjects at all levels as a result of these, it becomes authoritative instructional approaches to adopt in order to keep up to advancement of 21centuary in teaching and learning aspect. Therefore, there are varieties of such approaches to be used, but use of advance organizers in imparting knowledge is exceptional. In a research conducted by Bukar, *et al.* (2021) on the impact of video advance organizers on NCE students' interest and retention in geomorphology concepts in Yobe State, Nigeria revealed that, there were higher significant difference in interest, performance and retention of students exposed to video advance organizer strategy in geomorphology concepts and there is no gender difference after treatment in any.

Moreover, in a research conducted by Abba in (2023) on the effect of advance organizers on students' interest and retention in concepts of Statics and Dynamics in Physics among secondary school in Kano State, Nigeria. The result in the major findings revealed that, there were significant difference in the Students' level of interest in concepts of Statics and Dynamics between those taught with the use of advanced organizers and those taught without the use of advance organizers in favour of the experimental group. But there was no significant difference in the mean scores of students' retention between the male and female taught concepts of Statics and Dynamics with advanced organizers only. Thus, this study aimed to test the influence of advance organizers in teaching mathematics.

Therefore, mathematics has been a primary requirement of schools' education system throughout the world, because, it plays a vital role in understanding of various concepts of sciences and science related subjects. Mathematics is the backbone of reasoning and language of reason and service (Karjanto, 2022). It is universal truth that, learners show interest in learning subject when the methodology of teaching it deals with ground-breaking ideas, thus, the effective teaching methodology of mathematics can be fruitful to its learners (Umoetuk, 2020).

Statement of the Problem

Today the educational outcomes in mathematics seem to have numerous setbacks due to so many reasons, but lack of interest from the side of learners towards the subjects is one of the major contributors and attributed to teaching strategies used by

teachers during instruction. Despite the efforts being made towards ensuring that citizens of the country (Nigeria) have equal educational opportunities in order to improve their level of interest in studying the subject (Mathematics) to understand and perform better in both internal and external examinations, it has been observed that, all is not well with the system due to lack of interest from the students lead to failure recorded in the subject in public examinations of WAEC in the recent years between the 2020 to 2023. Despite the efforts being made by the FME and SME and other relevant agencies embarked on capacity building workshops and seminars aimed at training and retraining of teachers for more efficient results, students have continued to showing luck of interest towards the subject for unknown reasons. As a result of these, many question was asked on the problem, why the lack of interest, what was the cause and how can it be tackled? In consonant with the works of Bukar et al (2021) and Abba (2023) which unanimously indicated that, advance organiser strategy is highly significant in term of enhancing Students' level of interest and retention. Therefore, to address the gap in general and particularly in Borno state, the researcher aims to instigate on the influence of using advance organisers in teaching mathematics to curtail the problems earlier stated.

Aim and Objectives of the Study

The aim of the study is to explore the influence of advance organizers strategy in teaching mathematics and the specific objectives are to:

1. Determine students' level of interest towards mathematics in Maiduguri Education Zone of Borno State.
2. Compare the interest towards mathematics between male and female students in Maiduguri Education Zone of Borno State.

Research Questions

1. What are the students' levels of interest towards mathematics in Maiduguri Education Zone of Borno State?
2. What level of interest towards mathematics between male and female students in Maiduguri Education Zone of Borno State?

Null Hypotheses

To further guide the objectives, the following null hypotheses were formulated to be tested at $\alpha = 0.05$ level of significance:

H_{o1}: There is no significant difference in students' level of interest towards mathematics in Maiduguri educational zone of Borno State.

H_{o2}: There is no significant difference in the interest towards mathematics between the male and female students in Maiduguri educational zone of Borno State.

Methodology

The study used was quasi experimental design to assess students' interest in Mathematics in Borno State, Nigeria. Two intact classes were used one as experimental and one as control group. The target study area is Maiduguri zonal education formed by 7 LGAs with 34 Secondary Schools, among the seven LGA, Maiduguri was selected for the study. The Maiduguri had 19 secondary schools with the total population of 65,628 students, 30,628 male and 35,000 female. The study sampled two schools using random sampling method, with two intact classes, one class was assigned as experimental group and taught mathematics with the used of advance organizer strategy

while the other one class as control group were taught using the conventional teaching method, and both groups were taught for eight weeks. The experimental group consist of 46 students (24 male and 22 female) while the control group consists of 52 students (33 male and 21 female). The instrument used for the purpose of data collection was questionnaire titled; Mathematics Interest Questionnaire (MIQ). The MIQ has a 20-item inventory questionnaire with four measurements of two positive and two negative responses mode to determine the students' interest in mathematics. It has two sections (A and B), section A required information on biographic data of the students while section B of the instrument contains twenty (20) items developed and adopted from the Likert's (1973) with four options of modified scale response mode of strongly agreed (SA) coded as 4, Agreed (A) coded as 3, disagree (DA) coded as 2 and strongly disagree (SD) coded as 1. Each option carries weight in the order of priority from four to one in positive interest responses and from one to four in negative interest responses.

The Content Validity of MIQ was carried out by two senior lecturers from Department of Education and Mathematics of University of Maiduguri. The instrument was subjected to pilot testing in one of the schools not selected for field work, with a group of 30 students and the MIQ test items was administered once. The reliability coefficient of the MIQ was computed using Cronbach's Alpha and 0.91 was obtained. Therefore, the instrument was reliable for the study.

The researcher administered the instrument (MIQ) to the participants before and after the treatment in order to determine the influence of the advance organizer on their interest level towards mathematics and gender disparity among the students. The data collected were analyzed Mann-Whitney (U-test) in testing the null hypotheses at alpha (α) = 0.05 level of significance, because the scale of measurement was ordinal. The Statistical Package for Social Sciences (SPSS) version 20.0 was used.

Result Presentation

RQ1: What are the students' levels of interest towards mathematics in Maiduguri Education Zone of Borno State?

The MIT was used in collecting the data in order to answer research question one (1) the the summary of the analysis is presented in table 1.

Table 1: Analysis of the Post-test Means and Standard Deviations Scores of the Experimental and Control Groups

Groups	Post – Test				
	N	Mean ($\bar{x}$)	S.D	Mean diff.	Remarks
Experimental	46	83.50	5.97	26.16	S
Control	52	57.34	6.31		

Result from table 1 reveled that, in post-test, mean scores and standard deviation of students in experimental group were 83.50 and 5.97 and that of the control group were 57.34 and 6.31respectively. With the mean difference of 26.16, this shows that the two groups had different in interest in Mathematics.

RQ2: What level of interest towards mathematics between male and female

students in Maiduguri Education Zone of Borno State?

The MIT was used in collecting the data in order to answer research question two (2) the post-test scores of male and female students in the experimental groups and the summary of the analysis is presented in table 2

Table 2: Analysis of the Post-test Means and Standard Deviations Scores of male and female students in the Experimental Groups

Groups	Post – Test				
	F	Mean ($\bar{x}$)	S.D	Mean diff.	Remarks
Male (Experimental)	24	83.02	4.90		
				1.78	NS
Female (Experimental)	22	81.24	5.91		

Results from table 2 revealed that, in the post-test, the mean score and standard deviation of the male students were 83.02 and 4.90 while that of the female students were 81.24 and 5.91 respectively. With the mean difference of 1.78 which is statistically not significant. This shows that there was no difference in the mean interest of boys and girls when exposed to Advance Organisers strategy.

Hypothesis One: There is no significant difference in students' level of interest towards mathematics in Maiduguri educational zone of Borno State?

Table 3: Influence of Advance organizer on interest toward mathematics among students in Maiduguri education Zone

Group	N	Median	U-test	p-value	Cohen's D	Remark
Experimental	46	84.00				
			16842	0.000	2.2	S
Control	52	58.00				

Results from table 3 revealed that, majority of the respondents agreed that there was positive interest towards mathematics while minority disagreed and this was determined from U-Test (16842) with p-value of 0.000 less than the level of significant (0.05), the large value of effect size (Cohen's d=2.2) represents a **large effect size**, indicating a substantial difference between the two groups. Therefore, hypothesis one was rejected.

Hypothesis two: There is no significant difference in the interest towards mathematics between the male and female students in Maiduguri educational zone of Borno State?

Table 4: Gender difference in interest towards mathematics in Maiduguri Education Zone of Borno State

Gender	N	Median	U-test	p-value	Cohen's d	Remarks
Male	24	84.01				
			1927.6	0.534	0.785	NS
Female	22	82.23				

Findings from table 4 revealed that, the analysis of the U-test on students' interest between male and female towards mathematics shown that, the median scores were 84.01 and 82.23 for male and female students respectively. The U-test (1927.6) with p-value 0.534 which indicated that, there is no significant difference in students' interest between male and female towards mathematics because, the Cohen's d value of 0.199 indicates a small effect size, meaning the difference between male and female is not significant. Therefore, the levels of interest towards mathematics were equal. Thus, hypothesis two was retained.

Discussion of Results

Results revealed that, there is significant difference in students' level interest towards mathematics among the respondents (students). This finding resonates with findings of Bukar, et al (2021) on the impact of video advance organizers on NCE students' interest and retention in geomorphology concepts and results revealed that, there was higher significant difference in students' interest in geomorphology concepts between the two groups too. The evidence suggests that, integrating advance organizers into mathematics instruction influences students' interest in the subject.

Results revealed that, revealed that, there is no significant difference in the students' retention between the male and female taught mathematics with the used of advance organizers only. This finding agrees with the findings of Bukar, (2021) on the impact of video advance organizers on NCE students' interest and retention in geomorphology concepts and there was no gender disparity and therefore, contributing to nature of gender differences across different instructional methods towards the subject areas (Mathematics).

Conclusion

Based on the findings of this study it concludes that, the gaining of interest towards mathematics can be adopted significantly through the use of Advance Organizer Strategy and to promotes and strengthens mathematical concepts among students. And it is gender-friendly, creates better in terms of interest among male and female students.

The study has significantly contributed and great implications for educational practices in Nigeria in the following ways; highlights the potential efficacy of Advance Organizer in enhancing students' interest towards mathematics, consistent across gender on level of interest irrespective of male and female students.

Recommendation

The finding recommends the following;

i. Teachers should frequently employ the use of Advance Organizer in teaching Mathematical concepts for better gaining of interest, towards the subject (Mathematics).
ii. The professional bodies like MAN, STAN, STEM in collaboration with the Federal and State Ministries of Education should embark on nationwide re-training of Mathematics.
iii. Teachers to implement mathematics classroom instructions based on use of advance organizers through regular national, state and local seminars, workshops and conferences.
iv. The study suggested further studies similar to this study

should be conducted with the used of advance organizers on another subject to compare the different with the mathematics and also to investigate the generalizability of on male and female students diverges across different educational variables and subjects.

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