VARIATION IN INTEREST TOWARDS MATHEMATICS BETWEEN STUDENTS WITH PRE-UNDERSTANDING OF PEDAGOGICAL SUBJECT MATTER AND THOSE WITHOUT PRE-UNDERSTANDING OF PEDAGOGICAL SUBJECT MATTER

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Abstract

The study investigated the variation in interest towards mathematics between students with pre-knowledge of instructional content and those without. A quasi-experimental research design that made use of pre-test post-test and control group was used. The population of the study consisted all SS1 Secondary School mathematics students. Twenty eight male and forty one female students were selected through two schools making a total of 69 students as Mathematics Achievement Test (MAT) and Mathematics Interest Scale (MAS) whose reliability indices are 0.83 and 0.79 formed the instruments of the work. While Mann Whitney U test and t-test statistical techniques were used in analyzing the data.The study revealed that students who were exposed to pre-knowledge of instruction content had more positive interest towards mathematics and better academic performance than those who were not exposed to pre-knowledge. Prominent among the recommendation is that teachers should explore exposing their students to pre-knowledge of instructional content before classroom activities to arouse their interest and enhance their achievement in mathematics.

Introduction

An interest is "a relative enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant object, groups, events or symbols". (Hogg & Vaughan, 2005). Interest can be described in terms of three components which include affective components, and it involves a person's feelings/emotions about the interest object. For example, I am scared of mathematics. Behavioral component, this involves the way the interest we have influences how we act or behave. For example, I will avoid mathematics lesson when I see the teacher coming. Cognitive component and it involves a person's belief/knowledge about an interest object. For example, I believe mathematics is a difficult subject.

Interest is defined by other researchers as positive or negative emotional disposition (Mcleod, 1992 and Aiken 2000). This has led to series of divergent views resulting from the findings of other researchers on the variation in interest towards mathematics-on-mathematics achievement among students.

Furthermore, the findings of Uhuavbi and Umoru (2005) used 100 students as sample to study the relationship between student's interest and achievement in mathematics and science among polytechnic students.

Analysis of data by correlation coefficient affect their achievement in mathematics perception of any task especially at the beginning affects the outcome of their exercise more than anything else does.

It concluded by stating that achievement of students in mathematics largely depends on their interest towards the subject. In a related study, Alugba (2005) using a sample of 200 students showed that interest has a significant positive relationship with mathematics achievement of students. The study suggest that positive interest will lead to high concentration and interest, which will invariably lead to persistent and better performance.

Poor level of understanding of mathematics by the students as a result of teaching method has contributed to the negative interest students have towards mathematics (Ammo, 2000). Therefore, this study seeks to investigate if any variation in students' interest towards mathematics exist between those with pre-knowledge of instructional content; and also to investigate the difference in academic performance between students pre knowledge of instructional content and those without it. It is hoped that this will serve as a guide in helping teachers to explore their students with pre-knowledge of instructional content before classroom activities to enhance their performance in mathematics.

Statement of the Problem

Despite efforts by various researchers, it has been observed that variation in students' interest towards mathematics exist. Research findings have shown that students display poor performances in mathematics due to negative interest towards mathematics (Alugba, 2005). Furthermore, Iji (2002), stated that mathematics teaching in Nigeria still follows the traditional pattern whereby teacher-directed explanations are used to present materials for the new lesson. So far, the traditional or conventional patterns of teaching mathematics do not seem to be effective in helping teachers to arouse the interest of students towards mathematics calls for an alternative approach.

It is assumed that there could be other alternative approaches, one of which is to ascertain the extent to which mathematics learning outcome (interest and achievement) are affected by their pre-knowledge of instructional content before classroom activities. This approach has been scarcely utilized by most mathematics teachers in Nigerian secondary schools.
Given the fact that students pre-knowledge of instructional content is one of the teaching approaches that may not have been adequately utilized by teachers in the teaching of mathematics, it has become desirable to investigate its variation in interest towards mathematics among students, if it could be an effective teaching technique that would arouse students interest towards mathematics to improve their performances in mathematics.

Purpose of the Study

This study is aimed at investigating the variation in interest towards mathematics between students with pre-knowledge of instructional content and those without.

Specifically, the study sought to:

i.   Determine if there is any variation in interest towards mathematics between students with pre-knowledge of instructional content and those without.
ii.   find out the difference in students' performance between students with pre knowledge of instructional content and those without

Research Question

The following research questions were asked to guide the study:

i. What variation in students' interest towards mathematics exist between those with pre-knowledge of instructional content and their counterparts without pre-knowledge of instructional content?

ii. What is the difference in performance between students with pre knowledge of instructional content and their counterparts without pre knowledge of instructional Content?

Research Hypothesis

The following hypothesis was stated and tested at 0.05 level of significance:

Ho_1: There is no significant variation in students' interest to mathematics between those with pre-knowledge and those without pre-knowledge of instructional content.

Ho_2: There is no significant difference in academic performance between students with pre knowledge of Instructional content and those without it.

Methodology

The design adopted for this study was quasi – experimental setting that made use of pre-test and post-test control group design. The dependent variables in this study are interest and achievement towards mathematics, the independent variable is the pre-knowledge of instructional content (treatment) at the two levels experimental and control group.

The target population of this study consisted of all SS1 students in Gwagwalada Area Council of FCT, Abuja. Simple random sampling technique was used to select the two schools in Gwagwalada Area Council, FCT. Two intact classes were involved in the study. The intact classes were selected through simple random sampling technique from the sampled schools. One of the schools was used as the experimental group while the other school was used as the control group.

Research Instrument

The instruments used for the study were as follows: Mathematics Interest Scale (MAS) and Mathematics Achievement Test (MAT). MAS was the researchers-made questionnaire of 20 items that was used to help student express their feelings towards mathematics.

The MAT is the researchers – made instrument that consisted of 30 items prepared based on the SS1 mathematics syllabus that covers the whole work for the term. The Mathematics Achievement Test (MAT) and the MAS were face validated by three experts in Mathematics Education and three in Science Education. An intact class of forty students having the same characteristics with those used for the main study and did not take part in the main study were used for the pilot test. The Crombach Alpha (2) was used to ascertain the reliability of MAS. This (KR - 21) formula was used to test internal consistency and reliability of MAT. The instrument gave 'r' value of 0.83 which were considered adequate for research.

Research Procedure

The researchers personally carried out the teaching for both groups. The students were subjected to pre-test to ascertain their entry behavior after which they were randomized into two groups. For the experimental group, pre-knowledge of the instructional content was given to the students before classroom teaching. The procedure was that, the teacher exposed the students to the contents of the curriculum for the whole term using the first lesson period. Detail of the curriculum content was given to the students and the students wrote them down in their note books to enable then go through the topics on their own using their text books prior to the classroom teaching.

It was experimental group that were exposed to pre-knowledge of instructional content while the control group were not exposed to the treatment (i.e having a pre-knowledge of the instructional content). Both groups were taught using conventional method. The period of the teaching lasted for ten weeks after which they were given the post-test examination. The MAS and MAT were scored over 100. The data were tested at 0.05 level of significant using mean, standard deviation and t-test analysis.

Presentation of Results

Data collected were analyzed using mean and standard deviation to answer the research question and inferential statistics of Mann Whitney U test and independent T test were used to test the hypotheses at 0.05 significant level.

Research Question 1. What variation of interest exist between Students with pre knowledge of instructional content and those without?

Group	N	Mean	Sd	Std Error	Mean Diff
Experimental	37	2.88	1.02	0.45	0.44
Control	32	2.44	1.OO	0.67	

Data from Table 1 shows that the students in Experimental Group have higher interest scores than the students in control group. However, the researchers cannot conclude until hypothesis is tested.

Ho$_1$: There is no significant variation of interest between students exposed to pre instruction content and those that were not. To test the hypothesis, Mann Whitney U test was employed.

Table 2:   Summary of Mann-Whitney on Variation of Interest Between Experimental and Control

Group	N	Mean Rank	Sum of Rank	Mann Whitney	P	Decision
EXPERIMENTAL	37	41	2400.50	4067.56	0.002	Reject
CONTROL	32	28	2033.50			

Results from Table 2 shows that p-value $0.002 < 0.05$ which indicates that the null hypothesis is rejected and the alternative hypothesis holds which indicates variation of interest between the Experimental and Control Group.

Research Question 2: What is the difference in mean Academic Performance score between students in the experimental and control groups?

Table 3:   Descriptive statistics showing experimental and control groups' mean Academic Performance Scores in the post test

Groups	N	Mean	SD
Experimental	37	28.8	1.02
Control	32	24.4	1.00

Results from Table 3 indicates that students in the experimental group has have higher mean scores than the students from the control group. However, this does not provide enough evidence for the researchers to draw conclusions. This gives rise for the need to test hypothesis.

Hypothesis 2

Ho$_2$:   There is no significant difference in academic performance between students who had pre-knowledge of instructional content (Experimental Group) and their counterparts in the control group.

Table 4:   Two tailed t-test Result in respect of mean Academic Performance Score of groups with pre-knowledge of instructional content and those in the control group

Group	N	Mean	SD	DF	T-value	Std. Error	Sig 0.05	Decision
Exptal.	37	28.8	1.02	67	2.33	0.0131	0.0421	Significant
Control	32	24.8	1.00					

Analysis of Table 4 indicate that subjects in experimental group had a mean score of 28.8 with standard deviation of 1.02 while those in the control group had mean score of 24.8 with a standard deviation of 1.00. in other words, the subjects in the experimental group had higher mean scores in terms of performance than their counterparts in the control group.

Discussion and implication of the Study

The findings of this study that there is significant variation between the mean interest scores of the experimental group exposed to pre-knowledge of instructional content and their counterparts in control groups. A cursory examination of Table 1 further experimental group had higher mean scores (in terms of interest) than their counterparts in the control groups. This shows that the subjects in the experimental groups had more positive interest towards mathematics than their counterparts in the control group. The findings of this study are similar to that of Alugba (2005) who showed that interest has a significant positive relationship with mathematics achievement of students. Furthermore, these findings support the findings of Galadima and Okogben in (2012) who found that there was significant variation in the interest of students exposed to the treatment than their counterparts who were not exposed to the treatment.

The reasons for the significant variation in students' interest to mathematics between those with pre-knowledge and those without pre-knowledge of instructional content could be due to the fact that, students who were not exposed to pre-knowledge of instructional

content before classroom teaching lacked prior knowledge of the topics which affected their performance in the subject, leading to a negative interest towards the subject. While those students that were exposed to pre-knowledge of the instructional content before classroom teaching were being motivated through this approach which arouse their interest in the subject, thereby creating a positive interest towards the subject leading to a high achievement in mathematics.

Furthermore, significant difference in terms of performance between the Experimental Group and the Control Group was found in favor of the experimental Group. The findings are in agreement with the findings of Uhuarbi and Umar (2005) who reported that interest is related to achievement. The findings of this work is also in line Aluba (2005) who reported that interest is significantly related to achievement. It can be deduced that the Experimental Group who were exposed to pre instructional Content have added advantages of knowing ahead of they are going to learn in the subject as a result of that they are more likely to develop more interest in the subject than the control Group.

Conclusion

The findings of this study have shown that exposing students to pre-knowledge of instructional content before classroom teaching will arouse the students interest towards mathematics and also enhances their performance in the subject. The study revealed that there was significant variation between the mean interest scores of the experimental group exposed to pre-knowledge of instructional content and their counterparts in the control group. This study has also shown that exposing students to having the pre-knowledge of instructional content before classroom teaching serves as one of the viable approach in teaching mathematics. It is therefore recommended that:

Mathematics teachers should explore their teaching approaches through exposing their students to pre-knowledge of instructional content before classroom activities. This will go a long way to arouse their interest and enhance their achievement in the subject.
Workshops and seminars should be organized for in-service mathematics teachers to keep them abreast with this viable teaching approach of giving students a pre-knowledge of instructional content before classroom activities in the teaching of mathematics.

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