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Senior Secondary School Students Achievement Towards Word Problems in Mathematics in Minna Metropolis, Niger State Nigeria

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Abstract

This study investigated the senior secondary school students' achievement towards word problem in Mathematics in Minna metropolis Niger State Nigeria. The reasons for this study students lack adequate knowledge of translating English statement to mathematics expressions. The population for the study comprised all senior secondary schools (class 2) in Minna metropolis. The sample for the study was 280 students (2000 males and 80 females). This were selected by random sampling technique in Minna metropolis. The study was based on quasi experimental deign. The instrument was Mathematics Achievement Test on Word Problems (MATOWOP), the instrument was subjected to pilot study and the reliability coefficient was 0.89. Two hypotheses were raised and the data collected was analyzed using SPSS version 20 with inferential statistics such as Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result of the research has shown that there was a significance difference in the students' achievement towards mathematics word problems. It was recommended that students' should be taught word problem in mathematics using problem solving models and teachers should be given opportunities to have more training in mathematics through workshop, conference and in-service training.

Keywords: Achievement, Word Problems, Mathematics

Introduction

Mathematics is one of the compulsory subject in Nigerian secondary schools. The learning of the subject was introduced into school's curriculum to produce competent persons that are skillful in applying mathematical knowledge in solving life problems. Mathematics is relevant to decision making process. Onwuachu and Nwakonobi (2009) revealed that improvement in the learning and teaching of Science, Technology and Mathematics (STM) is important in order to find the basis for technologically sound workforce in line with the nation's developmental needs. Mathematical word problem solving has been and will be a necessary skill not only in mathematics but in everyday living. Part and parcel of problem solving is to translate word problems into mathematical equation. However, senior secondary school student have difficulties in analyzing and interpreting word problems especially in Minna metropolis senior secondary school. Student can easily perform an indicated operation but when given in verbal forms, student need to first identify what operation is involved by translating this into a mathematical sentence before actually performing the operation and arriving at the correct solution.

Fajemidagba *et al.* (2012), descried Mathematics as a core science subject and tool for the development of any science based discipline. These include: astronomy, graphics, industry and analytical thinking in daily living. Mathematics is an important subject with wide application to every life, yet Mathematics is often considered as a difficult subject in schools (Pradeep, 2012). Mathematics as a bedrock of science subject has continued to create high level involvement towards national growth in any country. It serves as a wheel on which other subjects advanced. Mathematics has a great level of application in major disciplines which is higher than any subject (Odogwu, 2002). Most of various field in science depend on Mathematics in solving problem, stating theories and predicting the results (Odili, 2006). In the present, Nigeria education system, Mathematics is highly rated that failure in it will disqualified candidate from gaining admission into university. Word problem refer to problems stated using grammatical statement rather than mathematics symbols (Ku & Sullivan, 2002; Reninger, Ewen & Laster, 2002). Individualized setting help students to answer word problem better that when questions are lifted directly from textbooks of Mathematics (Bates & Wiest, 2004). Different opinion of Reninger *et al.* (2002) who asserted that personalized individual interest in context can have a variation aftereffect towards students since the meaning of problem can be connected within contexts.

Basically, the subject mathematics is offered in Niger State schools as compulsory subject in the curriculum. Students have partial interest on the subject, reasons are lack of enough competent mathematics teachers, phobia by the students, that is it is very difficult to learn, lack of basic foundation by the students, insufficient materials, lack of proper intervention by the government and parents (Odili, 2006). The findings of Kurumeh and Imoke, (2008) revealed how accomplishment academically by student's mathematics at all levels of education. It shows that mathematics is difficult, to learn and that the foundation which student have in mathematics is very weak. These have resulted to poor performance in SSCE, West African Examination Council and NECO. According to (Odili, 2006) the major reasons that cause poor academic achievement in mathematics in both primary and secondary schools are classified into three main classes as mathematical, pedagogical and psychological. The pedagogical problems include factors such as insufficient qualified Mathematics teachers, insufficient instructional materials for teaching and learning of mathematics and continuous usage of conventional method. The Chief Examiner's report of West African Examination Council (WAEC, 2011) contained that the problem affecting mathematics achievement can be related to teacher's methods or techniques of presenting the concepts in the curriculum to students of which problem solving is an aspect.

Mathematics is the study of the measurement, properties and relationships of quantities and sets, using numbers and symbols or a science (or group of related sciences) dealing with the logic of quantity and shape and arrangement. Word problem refers to any mathematical exercise where significant background information on the problem is presented as text rather than in Mathematical notation. Achievement is the action of accomplishing something or this is a result gained by effort or the quality of a student's work feat. The importance and priority given to a subject in the society which is mathematics must generate academic consideration through a process participating in the development of the world technologically is worth seeking for. Completion of secondary education will determine the height a student can get to and a discovery of his potential when pursuing a career academically. Result obtained at the end of this research will enhance better understanding in a situation where and achievement in mathematics. The students will be exposed to a better learning strategy that will enable them have better understanding of some abstract concepts in Mathematics that will significantly improve on their academic achievement in this subject. They will be able to

relate functions to the equations, in a more realistic way especially with the help of instructional package being developed by the researcher. It will assist students develop positive attitude towards learning, also help teachers to be able to use the developed instructional materials to enhance Mathematics teaching. It will make the teachers have a shift from chalk board method of teaching that is teacher-centre to instructional materials that is students-centred.

The finding of this study will be useful to mathematics teachers since teachers serve as a role model to any society. Teachers inspire and encourage striving to get to a high level of potential discovery and bringing out a noteworthy individual for greatness. Learning can be acquired by being committed to excelling and the capability for one to discover development personally. The teacher serves as an adviser and guidance. And students will be the beneficiaries of the findings that will be as a result of their achievement and attitude towards mathematics word problems solving.

Statement of the Problem

The Nigeria nation and other nations of the world have shown tremendous concern about the poor achievement of students in science and mathematics (Akubuiro & Joshua, 2004; Bayer Corporation, 2013). This poor achievement of student in mathematics in Nigeria – a country that need mathematics for its development, deserves the total attention of educational planners, teachers and researchers in Nigeria for a possible turnaround of the poor achievement of student in science and mathematics. The actual problem identified by the researcher was senior secondary school student in Minna metropolis of Niger State are finding difficulties translating word problems in mathematics into mathematical equation.

The study aimed at investigating the achievement in mathematics of senior secondary students and their attitude towards word problems solving. Specifically, the study sought to:

1. Determine Senior Secondary School Students' achievement on word problems in Mathematics in Niger State.
2. Determine the effect of gender on Senior Secondary School Students' achievement on word problems in Mathematics, in Niger State.

Research Questions

The study attempted to find answers to the following research questions.

1. What is the achievement of Senior Secondary School Students on word problems in Mathematics in Niger State?
2. What is the effect of gender on Senior Secondary School Students achievement in word problems in Mathematics in Niger State?

Hypotheses

The significant level of $P \leq 0.05$ was used as the bedrock for testing the listed null hypotheses below.

HO_1: The mean achievement result of Senior Secondary School Students on word problems in Mathematics in Niger State is not significant.

The mean achievement result of Senior Secondary School male and female students on word problems in Mathematics in Niger State is not significant.

Research Methodology

Pursuant to the aims of this study, the researcher used Quasi-experimental design to collect the necessary data. Quasi-experimental design is used to compare participant groups and measure the degree of change occurring as a result of the treatment. The variables investigated was achievement. The achievement test was measured using scores from a pre-test and a post-test. The students were taught the polya strategy three times in a week. Then the researcher administration the post assessment and scored results were evaluated and analyzed.

Table 3.1: Quasi-Experimental Design Layout

Group	Pre-Test	Treatment	Post-Test
EXPERIMENTAL	O1	X1	O2
GROUP	O3	-	O4
Where:			
O1, O3	- Pre-test Scores		
O2, O4	- Post-test Scores		
X1	- Treatment		

-	- No Treatment

The MATOWOP was validated by Mathematics experts from Department of Mathematics, Federal University of Technology, Minna and two qualified Mathematics teachers, who are senior team leaders (Examiners) for General Mathematics in West Africa Examination Council (WAEC) and National Examination Council (NECO). Sixty (60) items of multiple choice with option (A to D) were submitted for validation based on their suggestions some items were corrected for consistencies and clarity 50 items were certified to have content validity.

A test re-test method was used to find the reliability of the (MATOWOP). The reliability was determined after a pilot test was conducted. Two weeks after the first test another test was conducted on the same students using the same instrument in line with Tuckman (1975) in Sambo (2008). The instrument had reliability coefficient of 0.89 using Kuder Richardson KR20 statistic. The instrument was considered reliable and adequate for the study. Inferential statistics ANCOVA was used for the data analysis. This is because the instruments used for data collection fall within the interval scale of measurement. A t-test was used for data generated from the questionnaire. All the analyses were done using Statistical Package for Social Sciences (SPSS) version 20 at 0.05 level of significance.

Results

Research Question One: What is the achievement of Senior Secondary School Students on word problems in Mathematics in Niger State?

Table 4.1: The Mean Achievement Scores and Standard Deviation of Students on Word Problems in Mathematics

Group	N	Pretest ($\bar{X}$)	SD	Posttest ($\bar{X}$)	SD	Average Gain
Experimental	200	32.70	8.68	72.93	11.08	40.23
Control	80	28.53	9.61	54.58	7.99	26.05

Table 4.1 shows that the students exposed to problem solving mathematics in word problems in mathematics had a mean achievement score of 72.93 with standard deviation of 11.08 while those students exposed to lecture method had mean of score 54.58 with standard deviation of 7.99. This

implies that the students exposed to problem solving method to solve word problem had a higher means score than those taught with lecture method.

Research Question Two: What is the effect of gender on senor secondary school students' achievement in word problems in Mathematics, in Niger state?

Table 4.2: The Mean Achievement Scores and Standard Deviation of Male and Female Students on Word Problems in Mathematics

Group	N	Pretest ($\bar{X}$)	SD	Post-test	SD	Average Gain
Male	120	33.40	9.38	82.18	6.88	48.78
Female	80	32.00	9.21	63.68	8.77	31.68

Table 4.2 shows that the male students exposed to problem solving mathematics in word problems in mathematics had a mean achievement score of 82.18 with standard deviation of 6.88 while female students had mean score of 63.68 with standard deviation of 8.77. This implies that the male students exposed to problem solving method to solve word problem had a higher mean achievement score than female students.

H_{O1} : There is no significant difference in the achievement of senior secondary school students on word problems in Mathematics, in Niger State.

Table 4.3: ANCOVA Analysis of Post-test of Mean Achievement Scores of Secondary School Students in Mathematics in Niger State

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Remark
Correct Model	17195.136[a]	1	17195.136	569.271	.001	Significant
Intercept	264.731	1	264.731	8.764	.003	Significant
Pretest	17195.136	1	17195.136	569.271	.000	Significant
Error	8397.135	278	30.206			
Total	287406.000	280				
Corrected Total	25592.271	279				

*: Significant at 0.05 level

Table 4.3 shows the ANCOVA results of the post-test scores of the students. The table shows that the F-value was 8.76 and the P-value (0.00) of the main effect is less than 0.05 alpha level ($p<0.05$). On the basis of this, hypothesis one was rejected. This shows that there was significant difference in the mean achievement scores of senior secondary school students on word problems in mathematics in Niger state.

HO_2: There is no significant difference in the achievement of male and female senior secondary school students on word problems in mathematics, in Niger state.

Table 4.4: ANCOVA Analysis of Post-test Scores of Male and Female Students on Word Problems in Mathematics

Source	Sum of Squares	df	Mean Square	F	Sig.
Correct Model	17340.707[a]	2	8670.354	291.059	.000
Intercept	290.882	1	290.882	9.765	.002
Covariate (Pretest)	15825.136	1	15825.136	531.240	.000
Main Effect (Gender)	145.571	1	145.571	4.887	.028
Error	8251.564	277	29.789		
Total	287406.000	280			
Corrected Total	25592.271	279			

*: Significant at 0.05 level

Table 4.4 shows the ANCOVA results of post-test scores of male and female students. The table shows that the F-vale was 4.88 and P-value (0.028) of the main effect is less than 0.05 alpha level ($P<0.05$). On the basis of this, hypothesis two was rejected. This shows that there was significant difference in the mean achievement score of male and female senior secondary school students on word problems in mathematics in Niger state.

Discussion of Findings

There is significant differences in the achievement of senior secondary school students on word problems in Mathematics, in Niger state. This was supported by Teahen (2015) who investigated if students' comprehension of mathematics word problems, their accuracy in choosing the correct

operation, and the number of word problems solved correctly could be increased through using drawings and mental visualization and discovered that both groups made improvements during their interventions in the number of problem solved, the number of operations choosen correctly, and in their ability to identify and write the equation described in the word problems. Both groups also increased their achievement in number only problems. The findings suggest that visualizing word problems is an effective strategy for solving mathematics word problems and is an important step as a part of a mathematics word problem solving process. Similarly, it is in line with the study of Esan (2015) who examined the impact of a cooperative problem-solving strategy on the learning outcomes of Nigerian secondary school students in algebraic word problems and observed that the analysis of the achievement and attitudinal tests showed that there was a significant main effect of treatment on students learning outcomes in both achievement and attitude towards algebraic word problems. In other words, the overall achievement of students exposed to (CPS) was better than those exposed to the conventional method. It was also supported by Wushishi, Yusha'u and Hassan (2013) who investigate the effect of computer assisted instruction package in Nupe language to determine the pupils achievement. The study showed that pupils taught mathematics with computer assisted instructional package in Nupe language performed better than those taught with conventional teaching method and gender has effect on their mathematics achievement scores.

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