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CRITICAL ANALYSIS OF THE FACTORS AFFECTING STUDENTS' PERFORMANCE IN MATHEMATICS IN SELECTED SECONDARY SCHOOLS IN SOKOTO METROPOLIS

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This study investigated factors affecting Senior Secondary School Student's Mathematics interest. The study indicated that individual factor, teacher factor, demographic factor, and Environmental factor are involved at all level of student's performance in mathematics. Two main instruments constructed were administered to a total of 240 students' in six randomly selected schools within Sokoto metropolis. The data collected were analysed using Pearson Product- moment correlation statistic and multiple regression analysis technique. Results showed that the four factors were effective in predicting secondary school students' performance in mathematics, though it depends more on individual factor and less on demographic factor. More so, all the factors correlate positively with the dependent measure. Furthermore, the two of the factors (teacher's factor and environmental factor) have significant relative effects on mathematics interest. The study revealed that mathematics interest among secondary school students within Sokoto metropolis largely depends on individual factor. It is recommended that government should organize training workshop for mathematics teachers frequently from which teachers can be equipped with various strategies with which they can use to teach students effectively to enhance their interest for mathematics learning.

Keywords: performance in mathematics, secondary school students

INTRODUCTION

1.1 Background to the Study

Mathematics(fromGreekword *máthēma*, "knowledge, study, learning") is the study of topics such as quantity (numbers),structure (Kneebone, 1963),space, and change(LaTorre*et al*., 2011). There is a range of views among mathematicians and philosophers as to the exact scope and definition of mathematics (Tobies and Helmut, 2012).Mathematicians seek out patterns and use them to formulate new conjectures. Mathematicians resolve the truth or falsity of conjectures by mathematical proof (Ziegler, 2011). When mathematical structures are good models of real phenomena, then mathematical reasoning can provide insight or predictions about nature. Through the use of abstraction and logic, mathematics developed from counting ,calculation, measurement, and the systematic study of the shapes and motions of physical objects. Practical mathematics has been a human activity from far back as written records exist. The research required to solve mathematical problems can take years or even centuries of sustained inquiry (Ramana, 2007).

The ability to learn mathematics is important because students need to possess high mathematics performance and high mathematics achievement. Therefore, lack of understanding on basic mathematical principles can result in an inability to solve numerous subjects such as chemistry, physics, engineering, and other scientific and management problems (Bursa and Paznokas, 2006). Geary and Hamson, (2000) stated that a better chance of employability, higher wages and higher achievement on job productivity once employed are correlated to the literacy in mathematics and

excellent quantitative competencies.

1.2 Statement of Problem

The declining popularity of mathematics among students and poor mathematical performance of students are not only a national problem but also a global concern for the past years (Mayer *et al*., 1991). Previous studies done by (Frank, 1990; Ernest, 1996; Sam, 1999) proved that negative beliefs about mathematics and mathematical problem solving are widespread among the public even in some developed countries. Recently, the Organization for Economic and Co-operation Development (OECD) Programme for International Student Assessment (PISA) 2003 data of student knowledge and skills of 15-year-olds showed countries namely; Greece, Italy, Luxemburg, Mexico, Norway, Poland, Portugal, The Slovak Republic, Spain, Turkey and the United States, as well as the partner countries Brazil, Indonesia, Latvia, the Russian Federation, Serbia, Thailand, Tunisia and Uruguay performed below the OECD average in problem solving proficiency.

In developing countries like Nigeria, for more than two decades mathematical problem solving has been the focus of schools and also, has always been approached by looking for competent teachers which cannot attend to every cause of low performance in mathematics while forgetting the interest of the students when trying to achieve the goal. Hence, this study intends to analyse the critical factors affecting the level of student's interest in learning mathematics by examining some factors that could affect the student performance in mathematics.

1.3 Purpose and Objectives of the Research

The general purpose of this study was to analyse the possible causes and factors affecting students' performance in mathematics in Sokoto metropolis as regards to implication and threats posed to the development of our country Nigeria and the development of science and technology and also to discuss possible ways to improve the conditions.

1.4 Research Questions

Considering the conceptual framework and literature review, this study attempted to answer the following research questions:

1. How do demographic factors such as gender and parent's opinion of importance affect student's attitude toward mathematics?

2. How do instructional/environmental factors and amount of time spent to study affect mathematics literacy and advanced mathematics performance scores?

3. How do the role of teachers and student interest affect mathematics literacy and advanced mathematics performance scores?

1.5 Hypothesis

Based on the limitation of literature review from previous studies, there are some information that are certainly controversial, there is still a large body of evidence suggesting differences in mathematics performance is gender biased (Capraro, 2001; Hong, 1999; Zhang and Manon, 2000; Ikegulu, 2000). A student's attitude toward mathematics has also been shown to be gender related, and in turn, can affect mathematics performance (House, 1995; Flynn and Moore, 1990; Tocci and Engelhard, 1991). Recent studies have broadened the scope of predictors to include student's environmental, teachers and demographic factors as part of the major influence in students' performance in mathematics.

1.6 Significance of the Study

This study is of immense significant as the findings would use in the following ways;

1. To help students overcome the unnecessary factors that has hampered their effective learning of mathematics in our secondary school.

2. To help the students improve on their performances in mathematics and other science/management related subjects.

3. The prevalent cases of examination malpractice amongst the secondary school students especially in mathematics would reduce to the barest minimal.

4. Knowledge of the causes of poor performances in senior secondary school will help the ministry of education board, parent, teachers, and principal to evaluate their different role and make necessary innovations on their planning.

5. It will equally help to improve on the number of candidates wishing to make career in mathematics and mathematics related course in our tertiary institutions.

6. Nigeria government stands to benefit from this research work in the aspect of positioning the country as a technological and industrialized nation since the bedrock of science and technology is mathematics.

Finally, this work will help the curriculum designers in their job and how to improve on the mathematics curriculum.

1.7 Scope of the Study

The research project was explored to analysis the factors affecting students' performance in mathematics in selected secondary schools in Sokoto Metropolis. For time and financial aspects in order to reach an irrevocable conclusion on the matter. The questionnaire and interview will be structured to cover only six secondary schools in Sokoto metropolis and the content would span on the causes of students' performance in mathematics in both internal and external examinations. The importance of mathematics to the national development will be brought to bear.
The secondary schools include;

1. Sheikh Abubakar Gumi Memorial School Sokoto
2. Shehu Shagari College of Education Staff Secondary School Sokoto,
3. Federal Government College Secondary School Sokoto,
4. Blue Crescent Nursery and Primary School Sokoto,
5. Nana Girls Senior Secondary School Sokoto and
6. Success Schools Sokoto.

1.8 Definition of terms

a) Demographic factors: these are the socioeconomic characteristics of a population expressed statistically, such as age, sex, education level, income level, marital status, occupation, religion, birth rate, death rate, average size of a family, average age at marriage.

b) Metropolis: a large busy city especially as the main city in an area or country or as distinguished from surrounding rural areas

c) Philosopher: is a person devoted to studying and producing results in philosophy.

d) Philosophy: an academic discipline that seeks truth through reasoning rather than empiricism.

e) Conjecture: a statement or an idea which is unproven but is thought to be true; a guess.

f) Phenomenon: an observable fact or occurrence.

g) Abstraction: the act of focusing on one characteristic of an object rather than the object as a whole group of characteristics.

h) Principle: a fundamental assumption or rule used to choose among solutions to a problem.

i) Epistemology: the branch of philosophy dealing with the study of knowledge or a particular theory of knowledge.

j) Domain: a group of related items, topics or subjects.

k) Meticulous: precise conscientious attention to details.

l) Correlation: one of the several measures of the linear statistical relationship between two random variables indicating both strength and direction of the relationship.

m) Pedagogical knowledge: is a type of knowledge that is unique to teachers and is the teacher deep understands of the processes and practices or method of teaching.

MLR: multiple linear regressions

LITERATURE REVIEW

This section talks about the review of related literatures in which the following subsections has already been reviewed.

- Demographic Factors such as Gender, Socio-Economic Status, Parents' Educational Level
- Instructional Factors such as Curriculum, Instructional Strategies and Methods, Teacher Competency in Math Education, School Context and Facilities
- Individual Factors such as Self-Directed Learning, Arithmetic Ability, Motivation or Concentration

2.2 Demographic Factors

Various demographic factors are known to be related to mathematics achievement. Gender, socio-economic status, and parents' educational level are factors that have been analysed in this study as predictors of math achievement.

2.2.1 Gender

Many variables have long been studied as predictors of mathematics achievement. However, gender issues on math achievement are studied most frequently by researchers. For instance, a study through a meta-analysis reveals that males tend to do better on mathematics tests that involve problem-solving (Goldin, 2002). Females tend to do better in computation, and there is no significant gender difference in understanding math concepts. Another study shows that females tend to earn better grades than males in mathematics.

Some recent studies have revealed that gender differences in mathematics education seem to be narrowing in many countries. However, studies indicate that as students reach higher grades, gender differences favour increase in math achievement by males (Mullis et al,. 2000). For instance, the results from the Third International Mathematics and Science Study showed that mathematics achievement scores of each gender group were close to each other at the primary and middle school years (Libienski and Gutierrez, 2008). However, in the final year of secondary school, evidence was found for gender differences in mathematics achievement. Another study, which was conducted to analyse factors that affect math achievement of 11th-graders in math classes with an identified gender gap, also showed that males scored higher than females on 11th grade math achievement test, but this difference decreased from 10th grade (Campbell and Beaudry, 1998).

In addition, gender differences in attitudes and perceptions of the usefulness of mathematics for middle school students were found statistically important (Dursun and Dede, 2004). For example, female students show less interest in mathematics and have negative attitude toward mathematics. It is also reported that girls tend to learn mathematical concepts by means of rules or cooperative activities, while boys have a tendency to be in a competition to master mathematical concepts (Bature and Bature, 2005).

The literature on gender differences provides evidences that gender issues impact achievement in mathematics. Hence, it is crucial for educators and researchers to pay attention to gender differences in the design of mathematics instruction.

2.2.2 Socio-economic status

Socio-economic status is determined to be a predictor of mathematics achievement. Studies repeatedly discovered that the parents' annual level of income is correlated with students' math achievement scores (Jeynes, 2002; Hochschild, 2003; McNeal, 2001). Socio-economic status was found significant in primary math and science achievement scores (Ma and Klinger, 2000). Another study found poor academic achievement of students to be attributable to their low socio-economic status (Grootenboer and Hemmings, 2007). Socio-economic status was examined and found to be one of the four most important predictors of discrepancy in academic achievement of students (aged 15) in reading,

mathematics, and science by the Program for International Student Assessment (Human Resources Development Canada, Statistics Canada, and Council of Ministers of Education Canada, 2001).

A number of studies showed that parents with higher socio-economic status are more involved in their children's education than parents of lower socio-economic status. This greater involvement results in development of positive attitudes of children toward school, classes, and enhancement of academic achievement (Beaton and O'Dwyer, 2002). It is believed that low socio-economic status negatively influences academic achievement, in part, because it prevents students from accessing various educational materials and resources, and creates a distressing atmosphere at home (possible disruptions in parenting or an increased likelihood family conflicts) (Israel et al,. 2001; Jeynes, 2002). For these reasons, socio-economic status of a student is a common factor that determines academic achievement.

2.2.3 Parents' educational level

Parents' educational level has been shown to be a factor in academic achievement. Parents serve as a role model and a guide in encouraging their children to pursue high educational goals and desires by establishing the educational resources on hand in the home and holding particular attitudes and values towards their children's learning. In this case, the educational attainment of parents serves as an indicator of attitudes and values which parents use to create a home environment that can affect children's learning and achievement.

A number of studies indicated that student achievement is correlated highly with the educational attainment of parents (Jeynes, 2002). For instance, students whose parents had less than high school education obtained lower grades in mathematics than those whose parents had higher levels of education (Campbell, Hombo, and Mazzeo, 2000). Research has shown that parents' educational level not only impact student attitudes toward learning but also impact their math achievement scores.

2.3 Instructional Factors

Instructional Factors such as Curriculum, Instructional Strategies and Methods, Teacher Competency in Math Education, School Context and Facilities are also seen and analyzed from the previous work of some educational scholar as the major elements among the factors affecting students' performance in mathematics.

2.3.1 Curriculum

Many concerns have been emphasized in the literature about the existing math curricula that the process of calculation or computation only involves the deployment of a set routine with no room for ingenuity or flair, no place for guess work or surprise, no chance for discovery, no need for the human being, in fact (Scheffler, 1975, p.184).

The concerns here are not that students should never learn to compute, but that students must learn how to critically analyse mathematical problems and produce effective solutions. This requires them to learn, how to make sense of complex math concepts and how to think mathematically (Dursun and Dede, 2004). Many mathematics curricula overemphasize memorization of facts and underemphasize understanding and application of these facts to discover, make connections, and test math concepts. Memorization must be raised to conceptualization, application and problem-solving for students to successfully apply what they learn. An impressive body of research suggests that curriculum that considers students to be incapable of metacognitive actions (e.g., complex reasoning) should be replaced with the one that sees students who are capable of higher-order thinking and reasoning when supported with necessary and relevant knowledge and activities (FRN, 2004). Research has also revealed evidence that curricula in which students' knowledge and skills grow is significantly connected to their learning, and therefore their achievement (Celiber 2005; Akinoso, 2011).

2.3.2 Instructional strategies and methods

Being successful in math involves the ability to understanding one's current state of knowledge, build on it, improve it, and make changes or decisions in the face of conflicts. To do this requires problem solving, abstracting, inventing, and proving (Ifamuyiwa, 2005). These are fundamental cognitive operations that students need to develop and use it in math classes. Therefore, instructional strategies and methods that provide students with learning situations where they can develop and apply higher-order operations are critical for mathematics achievement.

In the literature, it is pointed out that for students to accomplish learning, teachers should provide meaningful and authentic learning activities to enable students to construct their understanding and knowledge of this subject domain (Waji, 2007). In addition, it is emphasized that instructional strategies where students actively participate in their own learning is critical for success (Akinoso, 2011). Instructional strategies shape the progress of students' learning and accomplishment.

2.3.3 Teacher competency in math education

Many studies report that what teachers know and believe about mathematics is directly connected to their instructional choices and procedures (Dursun and Dede, 2004). Hill et al., (2005) also reported that "in mathematics education research, it seems to be undisputed that the teacher's philosophy of mathematics has a significant influence on the structure of mathematics classes". Teachers need to have skills and knowledge to apply their philosophy of teaching and instructional decisions.

Teachers not only need knowledge of a particular subject matter but also need to have pedagogical knowledge and knowledge of their students (Bransford et al., 2000). Teacher competency in these areas is closely linked to student thinking, understanding and learning in math education. There is no doubt that student achievement in math education requires teachers to have a firm understanding of the subject domain and the epistemology that guides math education (Waji, 2007) as well as an equally meticulous understanding of different kinds of instructional activities that promote student achievement. Competent math teachers provide a roadmap to guide students to an organized understanding of mathematical concepts, to reflective learning, to critical thinking, and ultimately to mathematical achievement.

2.3.4 School context and facilities

School context and its facilities could be an important factor in student achievement. In fact, identifying factors related to the school environment has become a research focus among educational practitioners. For instance, research suggests that student achievement is associated with a safe and orderly school climate (Dember et al., 2008). Researchers also found a negative impact on student achievement where deficiencies of school features or components such as temperature, lighting, and age exist. In a study by Zulber (2004), temperatures above 23° C (74° F) adversely affected mathematics skills. In terms of the condition of school building, Okwu and Kururme (2010) found student achievement scores in standard buildings to be lower than the scores of students in above standard buildings. In addition, Heinesen (2010) conducted multiple regression statistical analysis to examine the relationship between overcrowded school buildings and student achievement. The findings indicated that a high population of students had a negative effect on student achievement.

2.4 Individual Factors

Many Individual Factors such as Self-Directed Learning, Arithmetic Ability, Motivation or Concentration etc. were also examined as part of the factors affecting students' performance in mathematics study in schools.

2.4.1 Self-directed learning

Self-directed learning could be a factor in students' math achievement. Mathematics learning requires a deep understanding of mathematical concepts, the ability to make connections between them, and produce effective solutions to ill-structured domains. There is no perfect, well-structured, planned or prescribed system that lets students think and act mathematically. This can be done if, and only if, students play their assigned roles in their learning progress. Self-directed learning has an important place in successful math learning. Self-directed students can take the initiative in their learning by diagnosing their needs, formulating goals, identifying resources for learning, and evaluating or monitoring learning outcomes (Idigo, 2010). The teacher's role is to engage students by helping to organize and assist them as they take the initiative in their own self-directed explorations, instead of directing their learning autocratically (Ifamuyiwa, 2005).

2.4.2 Arithmetic ability

Arithmetic ability could also be another predictor of math achievement. Arithmetic ability includes the skills such as manipulating mathematical knowledge and concepts in ways that transform their meaning and implications. It allows students to interpret, analyze, synthesize, generalize, or hypothesize the facts and ideas of mathematics. Students with high arithmetic ability or mathematical reasoning can engage in tasks such as solving complex problems, discovering new meanings and understanding, and arriving at logical conclusions (Anderson, 2013).

Arithmetic ability was determined by various studies as a critical factor on students' math achievement. For instance, in a study by Zulber (2004), arithmetic ability gave the highest correlation coefficient with mathematics achievement. Similarly, student achievement scores were found to be most strongly predicted by level of ability. Some other researchers have also investigated the relationship of gender issues and arithmetic ability on math achievement. For instance, Libienski and Gutierrez, (2008) conducted a study to investigate longitudinal data gathered over 10 years with an aim at asking whether personality traits were related to gender differences in long-term achievement in mathematics and the sciences. The study revealed that math ability was the most significant predictor of long-term achievement in

math for young women. However, the level of math ability did not seem to be a factor of long-term math achievement for young men

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2.4.3 Motivation or concentration

Mathematics education requires highly motivated students because it requires reasoning, making interpretations, and solving problems, mathematical issues, and concepts. The challenge of mathematics learning for today's education is that it requires disciplined study, concentration and motivation. To meet these challenges, learners must be focused and motivated to progress. Broussard and Garrison (2004). The teacher's role in students' motivation to learn should not be underestimated. In helping students become motivated learners and producers of mathematical knowledge successfully, the teacher's main instructional task is to create a learning environment where students can engage in mathematical thinking activities and see mathematics as something requiring "exploration, conjecture, representation, generalization, verification, and reflection" (Colakoglu and Akdemir, 2008).

2.5 Summary of the literature review

This literature seeks to unearth the factors that affect student's underachievement in mathematics in some selected schools. Three major factors were reviewed from most of the gotten literature work that relates to this research study. Firstly is Demographic Factors such as Gender, Socio-Economic Status, and Parents' Educational Level. Secondly is Instructional Factors such as Curriculum, Instructional Strategies and Methods, Teacher Competency in Math Education, School Context and Facilities. Thirdly is Individual Factors such as Self-Directed Learning, Arithmetic Ability, Motivation or Concentration. Based on their findings, Results revealed that instructional strategies and methods, teacher competency in math education, and motivation or concentration were the three most influential factors that should be considered in the design decisions.

METHODOLOGY

This chapter gives an indication of what was done to achieve the goals of the present study and the purpose was to survey the factors responsible for students' performance in mathematics in selected senior secondary schools in Sokoto Metropolis, Sokoto State.

The methods and techniques used in collection of data, the research design, population and sampling, sampling techniques, research instrument were validity of instruments and reliability of instruments.

This study used descriptive-correlation method of research design for the questionnaires. This was considered appropriate for the study compared with studies done by Idigo (2010). The subjects used for the study were schematically drawn from six randomly selected secondary schools in Sokoto State. The target population of the study comprised four public senior secondary school students and two private senior secondary schools, out of which 20 students from each of SS1 and SS2 were selected in each schools to give a total of 40 students per school. This gave a total of 240 students' altogether in all the six school within Sokoto metropolis. The research instrument are questionnaires, past WAEC record, interview for the teachers and a test conducted for the students, which are categorized into four factors such as Demographic factors, Teacher Factors, Individual/Student Factors, and Instructional/Environmental Factors. Teacher factors were composed of mastery of the subject, instructional technique, strategies and attitude, communication skills, personality and professional aspect, and classroom management. Student factors were composed of study habits, attitude and interests towards mathematics subject, and time management. Environmental factors were composed of teaching aids, class size or population, class settings, weather condition. Demographic factors were composed of parents' values, parents' attitudes, parents educational level, parents' economic status, and gender differences.

3.2 Research Design

The research design used for the study was the survey design. It was designed to collect data on the factors responsible for students' performance in mathematics in selected senior secondary school within Sokoto Metropolis.

The questionnaires were distributed among both public and private senior secondary school students of the SS1 and SS2 students within the study area, where a short test was later conducted for them to be able to have their test result for analysis of their variance.

3.3 Population and Sample

The target population for this study consists of 20 students for each grade level (that is 20 students for SS1 and 20

students for SS2) of the selected senior secondary schools. The samples weresum up to a total of 240 students for the six schools within the study area. The schools used are Sheikh Abubakar Gumi Memorial School Sokoto, Shehu Shagari College of Education Staff Secondary School Sokoto, Federal Government College Secondary School Sokoto, Blue Crescent School Sokoto, Nana Girls Senior Secondary School Sokoto and Success Schools Sokoto

3.4 Sampling Techniques

A random selection method was used in selecting six schools within the study area for population and sample collations, 20 students were selected from SS1 and another 20 students from SS2 in each school to give a total of 40 students per school. This gave a total of 240 students.

3.5 Instrumentation

The relevant data and information were collected with students' questionnaire. It was based on the 5-point Likert scale responses such as Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD). The respondents were asked to tick (√) only one option. The structured questionnaire is in two sections. Section A: demanding information on the personal details of the students, sex, class, school and age. Section B itemized the measuring factors such as; the individual factors, demographic factors, the teacher's factor, instructional/environmental factors.

3.6 Validity of Instrument(s)

The instrument was facially validated by an expert in measurement and evaluation at institute of education, Ahmadu Bello University, Zaria with three professional diploma students in education of this institution.

3.7 Reliability of Instrument(s)

The reliability of the questionnaire was established by administration of the instrument to selected secondary schools through test/retest method.

3.8 Method of Data Collection

The instruments were administered to the 240 sampled students. The administration of the instruments was done with the permission of the principals and the teacher of the selected schools used for the study. The questionnaires were administered in anonymity of the sampled subjects, which were return few hours after which they have been guided on how to fill it.

3.9 Method of Data Analysis

Pearson Product-Moment correlation statistic and MLR analysis techniques. In Data Analysis Tool Pack in MS Excel (Microsoft.inc) and SPSS 23 (BMP.inc) were used to analyse the data generated with the instruments.

RESULT AND DISCUSSION

This chapter covers the numerical finding and its interpretation for the designed goals of the present study. As it clearly indicates the factors responsible for students' poor performance in mathematics in the senior secondary certificate examination in Sokoto Metropolis, in Sokoto State, Nigeria. Based on this, the chapter is entitled data presentation using Pearson Product- moment correlation statistic and multiple regression analysis technique and discussion were made based on the significance of each factor and their respective extent of influence in determining the students' poor performance in mathematics.

4.2 Data Presentation

The results of the study were presented in line with the research questions and hypotheses. All the questionnaire was retrieved of which about 50% were male and 50% were female and average age of the students is about 15-17years.

4.2.1 Significance of the test

Table 4.1shows the relative influence of mathematics interest test-scores on the independent variables. From the table

the individual factor with 10.6995 as the magnitude of t-value and significant at 0.0017. Thus, significant value (0.0017) is less than .05, (*i.e*. 0.0017 < p < .05). Therefore, t is significant at .05. Similar results hold for teacher's factor and environmental factor, while demographic factor shows a different result

Table 4.1: Relative influence of the Independent Variables on Students' Interest in Mathematics.

Factors	*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Remark*
Intercept	84.4713	7.1816	11.7622	0.0013	*S
individual factors	-18.4577	1.7251	-10.6995	0.0017	*S
Demographic factors	1.2560	0.5856	2.1446	0.1213	*NS
Teacher's factors	5.9552	1.7165	3.4694	0.0404	*S
Environmental factors	10.7974	1.4701	7.3445	0.0052	*S

*S =Significant (at P<0.05). *NS = Not significant (at P>0.05)

4.2.2 Correlation analysis

Based on the relative influence of the independent variables on students' mathematics interest, as showed in table 4.2, the correlation coefficients of the individual variables and mathematics performance are 0.5863, 0.4121, 0.5196, 0.5114 for individual factor, demographics factor, teacher's factors and environmental factors respectively which means that relationship exists between the independent variables and students' mathematics interest.

Table 4.2 correlation between mathematics performance and independent factor

Variables	*Individual factor*	*Demographic factors*	*Teacher's factors*	*Environmental factors*	*Mathematics performance*
Individual factor	1.0000	0.9527	0.9930	0.9945	0.5863
Demographic factors	0.9527	1.0000	0.9651	0.9551	0.4121
Teacher's factors	0.9930	0.9651	1.0000	0.9909	0.5169
Environmental factors	0.9945	0.9551	0.9909	1.0000	0.5114
Mathematics performance	0.5863	0.4121	0.5169	0.5114	1.0000

4.2.3 MLR analysis for student interest in mathematics

Table 4.3 shows that the four independent variables had significant multiple correction on the students' performance in mathematics when taken together (R= 0.992; R^2=.984). The result further showed that 96.29% of the variation in students' performance in mathematics was accounted for by the independent variables. As shown in table 4.3, the F-value of 46.416 at P<0.05 from the analysis of variance result the significance level was significant. However, the multiple regression which is positive in the interest test is due to the four factors taken together, with adjusted multiple regression coefficient (R) of 0.992 which confirmed that there is significant multiple relationship between mathematics interest individual factor, teacher factor, demographic factor and environmental factor.

Table 4.3 Regression analysis of mathematics performance

Regression Statistics	
Multiple R	0.9920
R Square	0.9841
Adjusted R Square	0.9629
Standard Error	2.6639
Observations	40.000

Table 4.4 Analysis of variance for student performance in mathematics

	Df	*SS*	*MS*	*F*	*Significance F*	*Remark*
Regression	4	1317.54	329.3849	46.41609	0.004965	*NS
Residual	34	21.28906	7.096352			
Total	39	1338.829				

4.3 Discussion

4.3.1 Relationship between variables and student interest in mathematics

The value of mathematics interest of students as a pivot upon which science and technology rotates and achievement of millennium development goals cannot be overemphasized. The findings of this study showed that teacher factor, individual factor, demographic factors and environmental factors are factors influencing students' mathematics interest. These factors were found to be significantly influencing the students' mathematics interest ($p<.05$) except for demographic factor which is not significant. In other words, these independent variables were effective in predicting students' mathematics interest. More so the study showed that the four independent variables had significant positive multiple correlation on students' performance mathematics interest when taken together ($R= 0.992$, $R^2 = 0.9841$). The observed F-ratio is significant at $P<.05$. This is an indication that the effectiveness of a combination of the independent variables in predicting students' mathematics interest, the magnitude of the relationships between students' interest to learn mathematics and a combination of independent variables is reflected in the values of coefficient of multiple regression R (.0.992) and multiple R squared (0.9841). Therefore, variability in students' mathematics interest is accounted for by a linear combination of the f independent variables. This finding is supported by earlier reports such as Usman and Nwoye (2010); Okwu and Kurume (2010); and Idigo (2010), which confirmed that some factors of students' achievement include student factor, societal factor, language problems, instructional strategy adopted by the teacher and so on However, this finding contradicts earlier findings of Ola-Alani (2001) and Akinoso (2011) who all reported teacher' factor, student factor and infrastructural problem made no significant contributions to the prediction of variation to achievement in mathematics. There is need for further enquiry to clarify this contradiction.

4.3.2 Correlation between variables and student interest in mathematics

The correlation coefficients of variables, individual factors, teacher factors, demographic factors, and environmental factors have positive relationship with students' mathematics interest. More so, based on the values of the t-stat and p-value associated with these variables indicate that the variable individual factor is the most potent contribution with 10.6995 and 0.0017 for t-stat and p-value and the demographic factors has the list contribution with 2.1446, and 0.1213 for t-stat and p-value respectively. The order of importance of the independent variables goes as individual factor >> Environmental factors >> Teachers factors >> Demographic factors

RESULT AND DISCUSSION

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4.2 Data Presentation

The results of the study were presented in line with the research questions and hypotheses. All the questionnaire was retrieved of which about 50% were male and 50% were female and average age of the students is about 15-17years.

4.2.1 Significance of the test

Table 4.2shows the relative influence of mathematics interest test-scores on the independent variables. From the table the individual factor with 10.6995 as the magnitude of t-value and significant at 0.0017. Thus, significant value (0.0017) is less than .05, (*i.e*. $0.0017 < p < .05$). Therefore, t is significant at .05. Similar results hold for teacher's factor and environmental factor, while demographic factor shows a different result

Table 4.2: Relative influence of the Independent Variables on Students' Interest in Mathematics.

Factors	*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Remark*
Intercept	84.4713	7.1816	11.7622	0.0013	*S
individual factors	-18.4577	1.7251	-10.6995	0.0017	*S
Demographic factors	1.2560	0.5856	2.1446	0.1213	*NS
Teacher's factors	5.9552	1.7165	3.4694	0.0404	*S
Environmental factors	10.7974	1.4701	7.3445	0.0052	*S

*S =Significant (at P<0.05). *NS = Not significant (at P>0.05)

4.2.2 Correlation analysis

Based on the relative influence of the independent variables on students' mathematics interest, the correlation coefficients of the individual variables and mathematics performance is 0.5863, 0.4121, 0.5196, 0.5114 for individual factor, demographics factor, teacher's factors and environmental factors respectively which means that relationship exists between the independent variables and students' mathematics interest.

Table 4.3 correlation between mathematics performance and independent factor

Variables	*Individual factor*	*Demographic factors*	*Teacher's factors*	*Environmental factors*	*Mathematics performance*
Individual factor	1.0000	0.9527	0.9930	0.9945	0.5863
Demographic factors	0.9527	1.0000	0.9651	0.9551	0.4121
Teacher's factors	0.9930	0.9651	1.0000	0.9909	0.5169
Environmental factors	0.9945	0.9551	0.9909	1.0000	0.5114
Mathematics performance	0.5863	0.4121	0.5169	0.5114	1.0000

4.2.3 MLR analysis for student interest in mathematics

Table 4.4 shows that the four independent variables had significant multiple correction on the students' performance in mathematics when taken together (R= 0.992; R^2=.984). The result further showed that 96.29% of the variation in students' performance in mathematics was accounted for by the independent variables. As shown in table 4.3, the F-value of 46.416 at P<0.05 from the analysis of variance result the significance level was significant. However, the multiple regression which is positive in the interest test is due to the four factors taken together, with adjusted multiple regression coefficient (R) of 0.992 which confirmed that there is significant multiple relationship between mathematics interest individual factor, teacher factor, demographic factor and environmental factor.

Table 4.4 Regression analysis of mathematics performance

Regression Statistics	
Multiple R	0.9920
R Square	0.9841
Adjusted R Square	0.9629
Standard Error	2.6639
Observations	40.000

Table 4.5 Analysis of variance for student performance in mathematics

	Df	*SS*	*MS*	*F*	*Significance F*	*Remark*
Regression	4	1317.54	329.3849	46.41609	0.004965	*NS
Residual	34	21.28906	7.096352			
Total	39	1338.829				

4.3 Discussion

4.3.1 Relationship between variables and student interest in mathematics

The value of mathematics interest of students as a pivot upon which science and technology rotates and achievement of millennium development goals cannot be overemphasized. The findings of this study showed that teacher factor, individual factor, demographic factors and environmental factors are factors influencing students' mathematics interest. These factors were found to be significantly influencing the students' mathematics interest (p<.05) except for demographic factor which is not significant. In other words, these independent variables were effective in predicting students' mathematics interest. More so the study showed that the four independent variables had significant positive multiple correlation on students' performance mathematics interest when taken together (R= 0.992, R^2 = 0.9841). The

observed F-ratio is significant at P<.05. This is an indication that the effectiveness of a combination of the independent variables in predicting students' mathematics interest, the magnitude of the relationships between students' interest to learn mathematics and a combination of independent variables is reflected in the values of coefficient of multiple regression R (.0.992) and multiple R squared (0.9841). Therefore, variability in students' mathematics interest is accounted for by a linear combination of the f independent variables. This finding is supported by earlier reports such as Usman and Nwoye (2010); Okwu and Kurume (2010); and Idigo (2010), which confirmed that some factors of students' achievement include student factor, societal factor, language problems, instructional strategy adopted by the teacher and so on However, this finding contradicts earlier findings of Ola-Alani (2001) and Akinoso (2011) who reported that teacher's factor, student factor and infrastructural problem made no significant contributions to the prediction of variation to achievement in mathematics. There is need for further enquiry to clarify this contradiction.

4.3.2 Correlation between variables and student interest in mathematics

The correlation coefficients of variables, individual factors, teacher factors, demographic factors, and environmental factors have positive relationship with students' mathematics interest. More so, based on the values of the t-stat and p-value associated with these variables indicate that the variable individual factor is the most potent contribution with 10.6995 and 0.0017 for t-stat and p-value and the demographic factors has the list contribution with 2.1446, and 0.1213 for t-stat and p-value respectively. The order of importance of the independent variables goes as individual factor >> Environmental factors >> Teachers factors >> Demographic factors

CONCLUSION AND RECOMMENDATIONS

This chapter shows an indication of the study findings as it encompasses the actual and magnitude of the decision made based on the result of the survey data analysis on the factors responsible for students' poor performance in mathematics in selected senior secondary schools in Sokoto Metropolis, in Sokoto State, Nigeria. In view of this, the chapter is known as conclusion and recommendations as it gives the summary of the findings, the conclusion and recommendation drawn from the result of the survey data analysis for the study to compliments its major goal.

5.2 Summary of Major Findings

The major findings of this study include the following;

1. Three of the four designed factors has a significant effect on the performance of the student in mathematics,

2. The student performance in mathematics could be properly predicted by the combination of the four designed factors .

5.3 Conclusion

The study revealed that mathematics interest among secondary school students within Sokoto metropolis largely depends on individual factors. Other factors such as demographic factor, teacher factor and environmental factors were also germane to student's performance in Mathematics. However, the variable shows that individual factor, teacher's factor, and environmental factor were positively related to students' interest in Mathematics. Hence, the hypothesis shows relatively significant in three factors except demographic factor.

5.4 Recommendations

The result of this study has made it clear that three of these variables were pertinent to students' interest in mathematics. Therefore, the following recommendations itemized below should be given priority attention:

1. Assessment of students for promotion from one grade level to another should be based on both student'sinterestand teacher's interest.

2. Government should always organizeworkshop for the mathematics teachers regularly from which teachers can be equippedwith various effective instructional strategies.

3. Government should provide schools with infrastructural facilities in addition to equipped and functional mathematics library/laboratory with trained mathematics assistants and attendants.

4. Students on their own should show interest in the subject and do extra work at home.

5. Parents should provide the requisite educational materials for their children both at home and at school.

6. The teacher should evaluate his/her teaching methodology constantly in order to improve on his/her teaching method

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