

**RELATIONSHIP BETWEEN MATHEMATICS PERFORMANCE AND ENGLISH LANGUAGE PROFICIENCY AMONG SENIOR SECONDARY SCHOOL STUDENTS IN BAUCHI METROPOLIS, NIGERIA**

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**ABSTRACT**

The study investigated the relationship between English language proficiency and mathematics performance among senior secondary school students in Bauchi metropolis. Explanatory correlational research design was used in the study. The population of the study comprised of all the nine thousand and sixty two (9062) SS2 Students within Bauchi metropolis. Three hundred and eighty three (383) SS2 Students were randomly sampled from twenty-two senior secondary school using Stratified Sampling Technique. Yamane-Taro Method of Sample size determination was used in the study. The instruments for data collection were English Language Proficiency Test (ELPT) and Mathematics Achievement Test (MAT). Mean and Standard deviation were used to answer research question 1 and 2 while Pearson Product Moment Correlation Co-efficient was used to answer research questions 3. English language proficiency was found to have positive and significant relationship with mathematics performance of senior secondary school students in Bauchi metropolis. It was recommended among others that Students' awareness should rest toward understanding the relationship between Language of Instruction and Mathematics performance.

**Keyword:** Mathematics, English language, Proficiency, Performance, Student.

**INTRODUCTION**

Many studies revealed that students' performance in mathematics at Senior School Certificate Examination (SSCE) has consistently being poor (Adeyemi, 2011; Sa'ad, Adamu & Sadiq, 2014; Aderonke, 2019). There are many factors responsible for the poor performance in mathematics among senior secondary school students. Students' poor performance in mathematics among senior secondary school is attributed to parental attitude, interrupted teaching, and dyscalculia (Difficulty to recognize numbers correctly) (Attwood 2014; Tshabalala & Ncube, 2013). Other revealed that students' negative attitude toward mathematics, anxiety and fear of mathematics, poor teaching methods, inadequate teaching materials/teaching aids and

overcrowded classes are some of the factors attributed to students' poor performance in mathematics (Ojimba, 2012; Sa'ad, Adamu & Sadiq, 2014). Karue and Amukowa (2013) added that home, environmental factors and family backgrounds as well as little participation of parents in the education of their children are the main factors responsible for students' poor performance in mathematics. Sa'ad, Adamu and Sadiq (2014) found that students' negative attitude toward mathematics, anxiety and fear of mathematics, poor teaching methods, inadequate teaching materials/teaching aids and overcrowded classes were some of the factors attributed to students' poor performance in mathematics.

Recently, added in the factors that contribute to students' poor performance in mathematics is language proficiency (Peng et al, 2020; Otieno, 2019; Ugonna, 2018; Dogo, 2018; Oneil, 2017; Rabiou & Ngozi, 2016; Robelle & Roland, 2016; Claudius & Bosco, 2015; Yushau & Omar, 2015). Language proficiency in this research is referred to as language of instruction, which is English language. Therefore, in this research English language proficiency is ability of a students to read, speak, and understand written expressions as well as vocabulary as evaluated by West African Examination Council (WAEC), National Examination Council (NECO) and National Board for Technical Education Board (NABTEB).

Prediger, et al (2018) found that language proficiency is the background factor with the strongest connection to mathematics achievement. Similarly, Yushau and Omar (2015) found that students' proficiency in English is a factor affecting their performance in mathematics. Dogo (2016) found that proficiency in the language of instruction determines students' performance in mathematics. This means that proficiency in the language of instruction is very important in teaching and learning. Henry, Beate and Nistor (2014) in their studies reported that inadequate English language proficiency is a significant predictor of low mathematics performance.

For instance, Peng et al (2020) presents a meta-analysis of the relation between language and mathematics. A moderate relation between language and mathematics was found in 344 studies with 393 independent samples out of more than 360,000 participants. Moderation and partial correlation analyses revealed the following: the relation between language and mathematics was stronger among native language speakers than among second language learners; language and mathematics predicted the development of one another even after controlling for initial performance. Otieno (2019) investigated the relationship between English language proficiency and mathematics achievement among English language learners. The result shows that the more proficient the English learners are on English language, the better their performance was in mathematics assessment.

Similarly, Prediger et al (2018) found that language proficiency is the background factor with the strongest connection to mathematics achievement. Ugonna (2018) also established a strong positive relationship between Final years' secondary school students' English proficiency and 4 WASSCE subjects English, biology, government, and Mathematics. In addition, Dogo et al (2018) found that proficiency in the language of instruction determines students' performance in mathematics. This means that proficiency in the language of instruction is very important in teaching and learning. Yushau and Omar (2015) found a mixed response among student perceptions on whether the change of language of instruction from Arabic to English has any impact on their mathematics understanding and performance. Henry, Beate and Nistor (2014)

in their studies reported that inadequate English language proficiency is a significant predictor of low mathematics performance. Essien (2016) found that the key factor responsible for the poor performance by learners was the low English language proficiency of the learner. Therefore, to improve performance in mathematics is to develop English language proficiency of the students. Therefore, language plays a pivotal role in both teaching and learning in every field of studies or human endeavors. Moreover, it is essential for mathematic learning, as the content of mathematics cannot be taught without the efficient use of language as a medium of communication. Yushau (2009) noted that the development of mathematics is through language and language is the means by which mathematics is communicated and learnt from the formation of concepts to the development of new forms of thoughts.

However, the effective use of language in teaching and learning of mathematical concept greatly helps the learner in understanding mathematics. So, language deficiency has the tendency of limiting classroom interaction, as the language of the classroom has an effect to the learners' understanding of mathematics. Yushau (2004) advocated that all forms of knowledge are 'filtered' through language and the chief item of knowledge in any culture is its language. The researcher therefore, seeks to investigate the relationship between English language proficiency and mathematics performance among senior secondary school students in Bauchi metropolis.

### **Statement of the Problem**

The poor performance of students in mathematics has become a point of concern by many researchers. Studies have shown that there are many factors attributed to students' poor mathematics performance. However, attributing poor performance in mathematics to any one factor may be difficult, as numerous studies have associated multiple factors for being responsible among students. For example, students' mathematics anxiety, teacher mathematics anxiety, attention deficit hypersensitivity disorder, and gender influenced low mathematics performance. Recently added among these factors is learners' English language proficiency. These imply that learners who are deficient in their language of instruction are at disadvantage in mathematics learning. Although, several studies on the role of language of instruction in teaching and learning mathematics were carried out internationally, and strong connection was established between learner's proficiency in the language of instruction and mathematics performance. To the best of the researcher's knowledge there is no similar research conducted on the relationship between English language proficiency and mathematics performance among Senior Secondary School students in Bauchi metropolis, hence the need for this research.

### **Objectives of the Study**

The general objective of this study is to investigate the relationship between English language proficiency and mathematics performance among Senior Secondary School students in Bauchi metropolis. The specific objectives of the study are to:

- i. Assess the English Language proficiency of senior secondary school students in Bauchi metropolis.

- ii. Assess the mathematics performance of senior secondary school students in Bauchi metropolis.
- iii. Determine the relationship between English language proficiency and mathematics performance of senior secondary school students in Bauchi metropolis.

### Research Questions

The study provides answers to the following research questions:

- i. What is the English language proficiency level of senior secondary school students in Bauchi metropolis?
- ii. What is the mathematics performance of senior secondary school students in Bauchi metropolis?
- iii. What is the relationship between English language proficiency and mathematics performance of senior secondary school students in Bauchi metropolis?

### METHODOLOGY

The descriptive survey research design was adopted for the study. The population of this study comprises of all the nine thousand and sixty-two (9062) SS2 Students. The SS2 students comprises of male and female (4339 male and 4723 female) from twenty-two public senior secondary school in Bauchi metropolis between the ages of 16 to 18. Using Yamane Yaro (1967), 383 SS 2 students were selected from 22 secondary school using Stratified Random Sampling technique. The instruments used for data collection include:

- i. English Language Proficiency Test (ELPT): The proficiency test, used to measure the performance of students in English Language was adopted from Fakeye and Ogunsigi (2009). The English Language proficiency test, tests both skills and knowledge of the students in reading-comprehension, grammar and written expressions as well as vocabulary. The test is divided in to three sections (3): section A Speaking, section B Reading, and section C Writing.
- ii. Mathematics Achievement Test (MAT) instrument was designed by the researcher based on SS2 mathematics syllabus of senior secondary schools. The instrument comprises of problems from number and numeration, inequality, algebraic process, equations, word problems, geometry, statistics and arithmetic progression with a total of 50 questions.

Each question has optional answers, A to D. The test was validated through expert advice. Time allowed for the two tests was 90 min. The two tests were based on 100% each. Research question 1 and 2 were answered using mean and standard deviation, while 3 and 4 were answered using inferential statistics (correlation and regression respectively).

### RESULTS AND DISCUSSIONS

Robson (2011) posited that the process and products of analysis provide the bases for interpretation. In this study, the relationship between English language proficiency and mathematics performance of senior secondary students was explored.

### Research Question One

What is the English proficiency of senior secondary school students in Bauchi metropolis?

Table 2: Level of Students' Proficiency in English language

Level of performance	F	%	x	Std Dev
70 & above	134	35.0		
60 – 69	125	32.6		
50 – 59	78	20.4	65.38	15.673
40 – 49	23	6.0		
0 - 39	23	6.0		
<b>Total</b>	<b>383</b>	<b>100</b>		

Table 2 shows that 35.0% of the sampled students scored 70 and above marks in the English proficiency test; while 32.6% scored between 60 – 69 marks; 20.4% scored between 50 – 59 marks. Also, 6.0% account for students with 40 – 49 marks as well as 0 – 39 marks. However, the overall mean mark is 65.38%.

### Research Question Two

What is the mathematics performance of senior secondary school students in Bauchi metropolis?

Table 3: Level of Students' Performance in Mathematics

Level of performance	F	%	x	Std Dev
70 & above	77	20.1		
60 – 69	105	27.4		
50 – 59	117	30.5	59.56	14.477
40 – 49	56	14.6		
0 -39	28	7.3		
<b>Total</b>	<b>383</b>	<b>100</b>		

Table 3 shows that only 20.1% of the sampled students scored 70 and above marks in the mathematics proficiency test; while 27.4% scored between 60 – 69 marks; 30.5% scored between 50 – 59 marks. Also, 14.6% account for students with 50 – 59 marks while 7.3% of the performance had below 40 marks. However, the overall mean mark is 59.56%.

### Research Question Three

What is the relationship between English proficiency and mathematics performance of senior secondary school students in Bauchi metropolis?

Table 4: Relationship between English Proficiency and Mathematics Performance

		ENGLISH	MATH
ENGLISH	Pearson Correlation	1	.751**
	Sig. (2-tailed)		.000
	N	383	383
MATH	Pearson Correlation	.751**	1
	Sig. (2-tailed)	.000	
	N	383	383

\*\* Correlation is significant at the 0.05 level (2-tailed).

Pearson's correlation was carried out to determine the relationship between English language proficiency and Mathematic performance of senior secondary students in Bauchi metropolis. The result showed a strong positive correlation between English language proficiency and mathematics performance ( $r=0.751$ ,  $p<0.05$ ).

## DISCUSSION

The findings revealed that English proficiency and mathematics performance of the SS 2 students in Bauchi metropolis is 65 % and 60% respectively. The study also found that there is a strong positive correlation between English Language Proficiency and mathematics performance of the students ( $r = 0.751$ ). This result agreed with the findings of Otieno (2019) that there is a statistically significant relationship between mathematics achievement and English language proficiency among English learners. In a separate study Robelle and Roland (2015) found a significantly positive relationship between English language proficiency and academic performance in science, mathematics and English language among Grade 8 students of Philippine Science High School while Rabiun and Ngozi (2016) found a significant positive relationship between Proficiency in English and Mathematics achievement among Nigeria Secondary School students. Ugonna (2018) also established a strong positive relationship between Final years' secondary school students' English proficiency and 4 WASSCE subjects English, biology, government, and Mathematics. In addition, Dogo et al (2018) found that proficiency in the language of instruction determines students' performance in mathematics. This means that proficiency in the language of instruction is very important in teaching and learning. Yushau and Omar (2015) have also found that students' proficiency level in English is a factor affecting students' performance in mathematics. Similarly, Prediger, et al (2018) found a significant and positive relationship between English language proficiency and mathematics achievement. And that language proficiency is the background factor with the strongest connection to mathematics achievement. This suggests that as English proficiency increases, so does academic performance of students in mathematics.

### Summary of Findings

- i. The mean performance of students in English language proficiency is 65.4%.
- ii The mathematics mean performance of students in senior secondary school is 59.6%.
- iii. There is a strong positive relationship between English language proficiency and mathematics performance of senior secondary school students.

## CONCLUSION

The study concluded that English Language proficiency has significant and positive relationship with mathematics performance of senior secondary school students in Bauchi metropolis. This is an indication that mathematics performance of SS 2 students increases as their English language proficiency increases.

## RECOMMENDATIONS

From the findings of the study, the following recommendations were made to be considered in the Bauchi State Secondary Education Programme:

- i. Student awareness should be rest toward understanding the relationship between language of instruction and their mathematics performance.
- ii. Teachers should increase effort in the development of English language as it relate to other subjects especially mathematics.

### Conflict of Interests

The authors have not declared any conflict of interests.

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