Pupils' Mathematics Anxiety as Correlate of Their Academic Achievement in Mathematics in Public Primary Schools in Rivers State, Nigeria

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Abstract: **This research work was carried out to find out if Pupils' Mathematics Anxiety relate with their Academic Achievement in Mathematics. The study was necessitated to improve on the Mathematics Achievement Scores of Public Primary School Pupils. 3 purposes of study were formulated, 3 research questions guided the study and 3 hypotheses were tested. Correlational research design was adopted for the study. The study had a population of 30,705 (15,256males and 15,449females) primary 5 pupils in the 943 public primary schools in Rivers State, Nigeria. The sample size of 1535 (763males and 772females) pupils was drawn using a combination of multi-stage and stratified random sampling techniques. The instruments used for data collection were pupils' mathematics anxiety questionnaire (PMAQ) and pupils' annual mathematics achievement scores (PAMAS). The PMAQ was validated by 3 experts in the faculty of education Nnamdi Azikiwe University, Awka Anambra State. The reliability coefficient of the instrument was determined using Cronbach Alpha which gave reliability index of 0.82. The Pearson Product Moment Correlation (PPMC) was used to answer the research questions and used to test the hypotheses at 0.05 level of significance. The result obtained revealed an inverse significant relationship between pupils' mathematics anxiety and their academic achievement in mathematics. Both male and female pupils' mathematics anxiety significantly relate to their academic achievement in mathematics. It was recommended among others that primary school teachers should use mixed ability grouping method, relate mathematics abstract concepts to real life, and use manipulative - concrete materials during instructions to reduce pupils' mathematics anxiety.**

Keywords**: Mathematics Anxiety, Mathematics Achievement, Feeble Mind-set**

I. INTRODUCTION

There are periods when individuals feel anxious or difficulties in handling challenges. People sometimes experience anxiety, even children experience anxiety as they grow up, i.e., they experience fear, worry or apprehension as normal way of growing up. Sigmund Freud, in his Psychoanalytic Theory, defined anxiety as an unpleasant feeling that can cause emotional distress (Puteh & Khalin, 2016).

Similarly, when pupils are faced with threatening situation that interferes in numerical tasks, resulting in alteration in their academic achievement in mathematics, such threatening situation in numerical tasks is said to be mathematics anxiety. Mathematics anxiety can be explained further as the lack of comfort one experiences when faced with pressures of solving mathematical problems either in academic situations or otherwise (Tobias, 2014). Francesca, Irene, Amy, Sara, Maria and Denes (2016) describe mathematics anxiety as the feeling of helplessness occasioned by negative thoughts of inability to do well in mathematical problems. They explained it to be the belief of individuals who see themselves as poor in mathematics and as among those who do not have 'mathematics brain'. Some pupils, 'the feeble mindedness' most times complain and most often say things like; "I hate mathematics", "mathematics is my worst subjects", "mathematics is too hard and I'll never pass it", or "mathematics is boring". Alireza, Nasrolah and Iraj (2013) explained that negative mathematics experience includes low participation, low challenge tolerance, falling further behind, behaviour problems and avoiding completely mathematics classes. Negative mathematics experiences lead to disengagement, lack of confidence and reluctance to try to improve in mathematical skills.

On the contrary, when pupils believe they can achieve a higher score in mathematics, they put in more energy and resources towards their vision. Francesca, Irene, Amy, Sara, Maria and Denes, affirm that mathematics anxiety is a debilitating negative emotional reaction towards mathematics. Mathematics anxiety is detrimental to success in mathematics, with the consequences of lower mathematics competence and poor mathematics achievement scores. William (2015) opined that mathematics anxiety hinders mathematics performance for high achievers.

Consequently, pupils who suffer from mathematics anxiety feel they are not capable of doing activities or involve in mathematics classes. Invariably, when pupils are disengaged in mathematics class activities due to anxiety, it will result to the pupils' lack of confidence and poor achievement score in mathematics.

However, it is important to note that success requires consistent achievement; achievement on its own depends on the individual ability to approach situations with utmost confidence. Mkpae (2014) posited that pupils' achievement is

a concept associated with measures of pupils' success or measures of how well pupils meet the standard set out by examining bodies or an institution. Correspondently, academic achievement in mathematics is the mathematics cognitive wellness of pupils as measured by the demonstration of mathematics skills acquired in the course of teaching and learning of numerical skills. Thus, academic achievement in mathematics is pupils' accomplishment in mathematics skills after a period of exposure to teaching-learning processes.

In the view of Asuru (2015), the focus of pupils' exposure to mathematics tasks is to measure the extent the skills of pupils in applying mathematical knowledge by demonstration have been achieved. Corroborating the above definitions, academic achievement in mathematics can be referred to as the exposure given to a learner to try out some numerical tasks/skills within the stated objectives which was presumed to have learnt or mastered. It can also be considered as a demonstration of understanding of mathematics concepts, skills, ideas and knowledge of a person (Muhammed 2012; Mkpae 2014), or as the display of knowledge attained or skills developed in numerical logics, measured in test, examinations, etc. and expressed in grades. Mathematics achievement is affected by internal and/or external factors. The internal factors include mathematics anxiety, cognition and emotion, which can either be activated or deactivated (i.e. being positive or negative).

Statement of the Problem

Pupils' poor achievements in mathematics are significant occurrences that need to be tackled and resolved so that their next level of education will not be gloomy. Poor academic achievement in mathematics may stem from challenges pupils face due to some school-related factors, teacher-related factors, home-related factors and/or pupils' internal factors (self-related). These factors may be responsible for pupils' inability to acquire needed mathematics concepts and logics, thereby leading to their poor grades in mathematics. Again, despite the importance placed on mathematics, most primary school pupils perceive the subject as difficult, boring, impractical, and abstract.

This situation oftentimes causes the pupils to repeat one or more academic sessions. Despite the consistent efforts by teachers, parents, philanthropies, religious bodies and other non-governmental agencies, and the government to ensure stable academic achievements in Mathematics at this foundational level of education, there has been a consistent outcry of pupils' poor academic achievement in mathematics. If nothing is done to improve on this abnormality, pupils will leave primary school and enter their next level of education with the same feeling of anxiety, negativity and less confidence at mathematics tasks. This is a very serious lacuna that needs to fill. Hence, this study intends to determine if there is relationship between pupils' mathematics anxiety and their academic achievement in mathematics in public primary schools in Rivers State.

Purpose of the Study

This study examined the nature of relationship that exists between pupils' mathematics anxiety and their academic achievement in mathematics in public primary schools in Rivers State. Specifically, the study sought to determine:

1. How primary school pupils' mathematics anxiety relate with their academic achievement in mathematics.
2. How male primary school pupils' mathematics anxiety relate with their academic achievement in mathematics.
3. How female primary school pupils' mathematics anxiety relate with their academic achievement in mathematics.

Research Questions

1. How does pupils' mathematics anxiety relate with their academic achievement in mathematics in primary schools?
2. How does male pupils' mathematics anxiety relate with their academic achievement in mathematics in primary schools?
3. How does female pupils' mathematics anxiety relate with their academic achievement in mathematics in primary schools?

Hypotheses

1. Pupils' mathematics anxiety does not significantly relate with their academic achievement in mathematics in primary schools.
2. Male pupils' mathematics anxiety does not significantly relate with their academic achievement in mathematics in primary schools.
3. Female pupils' mathematics anxiety does not significantly relate with their academic achievement in mathematics in primary schools.

Significance of the Study

How pupils' mathematics anxiety relates with their academic achievement in mathematics in primary schools in Rivers State is the aim of this paper. The paper as a working document can be placed in the school libraries to be assessed by primary school teachers, and presented in academic conference for the benefit of the conferees (primary school teachers, parents/guardians, educational stakeholders and further researchers).

Pupils will adjust their anxiety level as the teachers deal with the internal factors that interfere with their achievement in mathematics as recommended in the study and learn to control the factors that warrant mathematics anxiety. Pupils will be better prepared when they tackle learning tasks in mathematics. Teachers will be equipped with relevant experiences and be better prepared to offer good counseling,

guidance and advise to the pupils on how to prepare adequately before they approach mathematics learning tasks.

The study will also provide information for teachers on aspect of conventional classroom instruction that will prepare the pupils adequately to confront numerical tasks with ease, thus increasing their mathematics achievement.

II. METHOD

The study adopted coorelational design, with a population of 30,705 primary five pupils, comprising of 15,256 males pupils and 15,449 females, found in 943 public primary schools in the 23 local government areas of Rivers State. The sample size was 1,535 (763 males & 772 females) primary five pupils in public primary schools of Rivers State. Both multistage procedure and Simple random sampling technique were used to arrive at the sample size. The instruments used for data collection was Pupils' Mathematics Anxiety Questionnaire (PMAQ), a pilot test was conducted on public primary school pupils in Bayelsa State, Nigeria for its reliability (0.82), this was because the original standardized instrument was adopted and modified to suit the subjects of the present study and the Pupils' Annual Mathematics Achievement Scores (PAMAS), which were gathered from their annual examination scores of 2018/2019 session.

Data Analysis

The Pearson Product Moment correlation was used to answer the research questions, and was also used to test the null hypotheses at 0.05 significant levels. The analyses was done using SPSS version 20. The decision rule for the null hypotheses was such that the hypothesis with P-value higher than 0.05 was accepted and the hypothesis with P-value lower than 0.05 was rejected. They were presented as follows; r=.00, no relationship; r=±0.1 to ±0.2 very low relationship; r=±0.21 to ±0.4 low relationship; r= ±0.41 to ±0.6, medium relationship; r =±0.61 to ± 0.8 high relationship and r =± 0.81 to 1.0, very high relationship.

Research Question 1 / Hypothesis 1

How does primary school pupils' mathematics anxiety relate with their academic achievement in mathematics?

Table 1: Summary of Pearson Product Moment Correlation (PPMC) Test for how pupils' mathematics anxiety relate with their academic achievement in mathematics

Variables	N	$\overline{X}$	SD	r.	Remark
Pupils' Mathematics Anxiety (X)		23.81	1.98		
	1520			-0.74	High Negative Relationship
Academic Achievement (Y)		28.85	1.83		

Table 1 shows the summary of the PPMC test for how pupils' mathematics anxiety relate with their academic achievement in mathematics. The result of analysis shows that the calculated correlation index is -0.74, indicating a high negative relationship between primary school pupils' mathematics anxiety and academic achievement in mathematics. This means that as the pupils' Mathematics text anxiety increases, their academic achievement decreases.

Ho_1: Primary school pupils' mathematics anxiety does not significantly relate with their academic achievement in mathematics.

Table 2: Summary of PPMC Significant Test for how pupils' mathematics anxiety relate with their academic achievement in mathematics

Variables	N	$\overline{X}$	SD	df	r.	P-value	Decision
Pupils' Mathematics Anxiety (X)		23.81	1.98				
	1520			1518	-0.74	0.01	Significant
Academic Achievement in mathematics (Y)		28.85	1.83				

*p<.05; df = 1518; critical r = -0.74

Table 2 reveals that at 0.05 level of significance and 1518 df, the calculated r is -0.74 with P-value of 0.01which is less than 0.05.Therefore, the null hypothesis is rejected. This means that primary school pupils' mathematics anxiety significantly relates with their academic achievement in mathematics, though at inverse proportion.

Research Question 2 / Hypothesis 2

How does male pupils' mathematics anxiety relate with their academic achievement in mathematics?

Table 3: Summary of PPMC Test for how male pupils' mathematics anxiety relate with their academic achievement in mathematics

Variables	N	$\overline{X}$	SD	r.	Remark
Mathematics anxiety of male pupils (X)		11.11	1.68		
	754			-0.65	High Negative Relationship
Academic Achievement of male pupils (Y)		14.76	1.83		

Table 3 summarizes the PPMC test for the how male pupils' mathematics anxiety relates with their academic achievement. The result of analysis shows a calculated r-value of -0.65. This indicates that male pupils' mathematics anxiety highly negatively relate with their academic achievement in mathematics. This shows that there is a high negative relationship between male pupils' mathematics anxiety and their academic achievement in mathematics. This means that as the male pupils' mathematics anxiety increases, their academic achievement in mathematics decreases.

Ho2: Male pupils' mathematics anxiety does not significantly relate with their academic achievement in mathematics.

Table 4: Summary of PPMC Significant Test for how Male pupils' mathematics anxiety relate with their academic achievement in mathematics

Variables	N	$\overline{X}$	SD	df	r.	P-value	Decision
Mathematics anxiety of male pupils (X)		11.11	1.68				
	754			752	-0.65	0.01	Significant
Academic Achievement of male pupils (Y)		14.76	1.83				

*p<.05; df = 752; critical r = -0.65

Table 4 shows the summary of the PPMC significant test. The result shows that at 0.05 level of significance and 752 df, the calculated r is -0.65 with P-value of 0.01 which is less than the alpha level. Therefore, the null hypothesis is rejected. This means that male pupils' mathematics anxiety relate significantly with their academic achievement in mathematics.

Research Question 3/ Hypothesis 3

How does female pupils' mathematics anxiety relate with their academic achievement in mathematics?

Table 5: Summary of PPMC Test for how female pupils' mathematics anxiety relates with their academic achievement in mathematics

Variables	N	$\overline{X}$	SD	r.	Remark
Female Pupils' Mathematics Anxiety (X)		12.70	1.78		
	766			-0.68	High Negative Relationship
Female pupils' academic achievement in Mathematics (Y)		14.76	1.83		

Table 5 summarizes the PPMC test for how female pupils' mathematics anxiety relates with their academic achievement in mathematics. The result of analysis shows a calculated r-value of -0.68. This indicates that female pupils' mathematics anxiety highly negatively relates with their academic achievement in mathematics. This indicates an inverse relationship. That is, when female mathematics anxiety increases, their academic achievement in mathematics decreases.

Ho_3: Female pupils' mathematics anxiety does not significantly relate with their academic achievement in mathematics.

Table 6: Summary of PPMC Significant Test for how Female pupils' mathematics anxiety relate with their academic achievement in mathematics

Variables	N	$\overline{X}$	SD	df	r.	P-value	Decision
Mathematics anxiety of female pupils (X)		12.70	1.78				Significant
	766			764	-0.68	0.00	
Academic Achievement of female pupils (Y)		14.76	1.83				

*p<.05; df = 764; critical r = -0.68

Table 6 shows summary of the PPMC significant test. The result shows that at 0.05 level of significance and 764 df, the calculated r is -0.68 with P-value of 0.00 which is less than the alpha level. Therefore, the null hypothesis is rejected. Thus, there is a significant relationship between female pupils' mathematics anxiety and academic achievement in mathematics.

III. SUMMARY OF FINDINGS

1. Primary school pupils' mathematics anxiety relates with their academic achievement in mathematics.
2. Male pupils' mathematics anxiety relates with their academic achievement in mathematics.
3. Female pupils' mathematics anxiety relates with their academic achievement in mathematics.
4. Primary school pupils' mathematics anxiety significantly relate with their academic achievement in mathematics.
5. Male pupils' mathematics anxiety significantly relate with their academic achievement in mathematics.
6. Female pupils' mathematics anxiety significantly relate with their academic achievement in mathematics.

IV. DISCUSSION

Result of analysis of the relevant research questions shows that primary school pupils' mathematics anxiety relates with their academic achievement in mathematics. The related hypothesis test indicates that primary school pupils' mathematics anxiety significantly relates with their academic achievement in mathematics. This finding is akin to Michael (2015) who found that mathematics performance is significantly related to numerical anxiety. This finding is also in line with Hulya, Cuneyt and Vildan, (2014) that investigated mathematics anxiety of Kocaeli University students. Similarly, Ronato (2014) found that mathematics anxiety of Bachelor of Elementary Education students in the University of Eastern Philippines relate with their academic achievement in mathematics, and a negative significant relationship was reported between anxiety level and mathematics achievement.

Furthermore, the hypotheses test shows that male pupils' mathematics anxiety relates significantly with their

academic achievement in mathematics. This result is supported by Ali, Hamid and Marzieh (2016) who investigated on how significant male students' mathematics anxiety relates with their mathematics academic achievement in the first grade High School of Manoujan Township. The result revealed that male students' mathematics anxiety relate negatively and significantly with their mathematics academic achievement.

On the other hand, the result of the analysis of female pupils' mathematics anxiety and how it relates with their academic achievement in mathematics revealed negative relationship. Further test of the hypotheses shows a significant relationship between primary school female pupils' mathematics anxiety and their academic achievement in mathematics, although negative.

Suffice it to mean that mathematics is generally viewed as a difficult subject to many pupils, both to the female and to the male, especially, for the primary school pupils.

V. CONCLUSION

Based on the findings of the study, it is concluded that pupils' mathematics anxiety is significantly related to their academic achievement in mathematics. Also, that both male and female pupil gets negatively anxious or apprehensive when they approach mathematics tasks, and are unduly influenced by their mathematics anxiety which is reflected on their academic achievement in mathematics.

Educational Implication of the Study

Primary school pupils' (male and female) mathematics anxiety significantly and negatively relate with their academic achievement in mathematics. This implies that the pupils, teachers, parents and other education stakeholders should ensure that pupils' self-related factors especially anxiety are positively developed by the provision of necessary motivating reinforcements.

VI. RECOMMENDATIONS

1. To mitigate mathematics anxiety among pupils, teachers should use the mixed ability grouping method, where students with high, medium and low abilities are grouped together and presented with a task to work through, and accommodate pupils' varied learning styles. This reduces their negative perception of mathematics as they watch and interact with others good with the subject.
2. Teachers should relate mathematical concepts to real life, encourage active learning; hands-on learning by using manipulative- concrete materials to represent abstract concepts, provide supports and encouragement.
3. Teachers should encourage critical thinking among the pupils, especially during mathematics classes.
4. The teacher should make positive reinforcement an integral part of instruction and mentorship in the classroom. Instead of punishments, parents and teachers may want to motivate kids through reward to help improve student learning and academic success.
5. The pupils should not rely solely on memory, should focus on past successes and ask for help when the need arises.

Suggestions for Further Study

The following suggestions were made for further study:

1. Similar research study should be carried out in other classes at primary school level.
2. Research work should be conducted on primary school teachers' mathematics anxiety as correlate of their pupils' academic performance in mathematics in Rivers State.

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