Students' Attitude towards Mathematics and Academic Performance in Public Senior Secondary Schools Madagali Local Government Area, Adamawa State

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Abstract: **This study focused on the attitude of students towards mathematics and academic performance in senior secondary schools in Madagali Local Government Area of Adamawa State. This study adopted a descriptive survey research design as it deals with people's views and hence was relevant to the study area. Two hundred (200) students responded to the questionnaire. Data were collected using the questionnaire and were analysed using mean, frequency counts and percentages to answer research questions 1 and 2 while t-test was used to test the two hypotheses raised at 0.05 levels of significance. The t-test analysis showed that there is a significant relationship between students' attitude and their academic performance in mathematics. The t-test analysis of students' responses to their attitude to Mathematics based on gender showed there is no significant difference between male and female students' attitude towards mathematics. Based on the research findings, the following conclusions were made; there is a significant relationship between students' attitude towards mathematics and their academic performance in Mathematics within Madagali Local Government Area. Also, that despite the low achievement of students in Madagali Local Government Area of Adamawa State, a positive relationship on attitude towards mathematics and performance in mathematics was detected. The following are recommended based on the findings of this study; There is need for mathematics teachers to help students have positive attitude towards mathematics by helping them to build confidence and by encouraging the belief that everyone can do mathematics. The Parent Teacher Association (PTA), Philanthropists and the Government should boost the mathematics achievement of students by building mathematics laboratories and providing library facilities in schools. Also, there is need for parents to encourage and sustain positive attitude towards mathematics in their children by providing the necessary materials for learning mathematics and ensuring that the home is conducive for learning.**

Keywords**: Academic Performance, Mathematics, Student Attitude, Student Performance, and Relationship**

I. INTRODUCTION

The attitude of students toward mathematics has been the subject of a great deal of attention from educators. Students with a positive attitude toward mathematics tend to enjoy the subject, understand its value, and have confidence in it; thus, they are likely to prioritize the study of mathematics (Lipnevich, Preckel, & Krumm, 2016). Mathematical knowledge is an essential tool in all civilizations. It is tools that can be used to assist us overcome problems in our daily lives. As a result, mathematics is often recognized as one of the most important core subjects in the school curriculum. Mathematics is more likely to be taught in schools and universities around the world than any other topic (Dowker, Cheriton, Horton, & Mark, 2019). Standardized tests and evaluations, on the other hand, show that students do not perform at the expected level. Mathematical underachievement among pupils is no longer confined to certain countries, but has grown into a global issue over time (Chen, Bae, Battista, Qin, Chen, Evans, & Menon, 2018). Most countries regard mathematics to be a key tool for political, social, scientific, and technological growth, as well as a basis for scientific and technological understanding (Adero, 2004).

Mathematics is one of the core subjects in Nigerian secondary schools and it forms the basic ingredient in the understanding of science and technology. This implies that mathematics as a subject occupies a significant position in the science curriculum. It serves as a pre-requisite for the study of Engineering, Computer Science, Geology, Electrical and Electronics, among others. A close look at the mathematics syllabus at all levels of the senior secondary school reveals the overall importance of the subject to both the individual as a person and the society (Ukpong, 1999). Therefore mathematics plays a key role in sharpening how an individual deal with the various spheres of private, social and civil life (Mohd, 2011). This justifies the compulsion of the study of the subject by all students who go through primary and secondary education in most countries.

However, attitude is a learned predilection of a person to react positively or negatively to any object, situation, concept or another person (Davadas, & Lay 2017)). Students usually develop positive or negative attitude towards mathematics in the process of learning mathematics at high school. Attitudes formed by students at high school level tend to remain for a

long time and determine their intention to study mathematics in higher education (Zhu, & Chiu, 2019). Quality of teaching mathematics, social, psychological climate of the class and perceived self-efficacy help develop positive or negative attitude towards mathematics among student. Individual's attitude towards mathematics is determined by several factors ranging from intra-personal to school climate and family background of the students. Students' self-efficacy, self-concept and achievements in mathematics, extrinsic motivation and anxiety towards mathematics are responsible for formation of beliefs and attitudes towards mathematics (Di Martino, & Zan, 2011). Classroom management, mathematics teachers' personality, teaching styles and materials along with examples presented in classroom are some of inter personal factors that influence the students' attitude towards mathematics learning (Turner & Meyer, 2009). Attitude is also affected by societal value, gender stereotype and home environment. Parental expectation, educational status and occupation of parent appear to be mediating factors for the formation of student's attitude towards mathematics (Chen, Bae, Battista, Qin, Chen, Evans, & Menon, 2018).

There are gender differences in attitude towards mathematics and females have more negative attitudes than that of males. Guo, Marsh, Parker, Morin, & Yeung, (2015). found that female students held more negative attitudes to mathematics than male students, and these differences increased gradually with age. The females lacked confidence, perceived mathematics as a male domain subject and suffered from anxiety in studying mathematics. Mohd (2011) investigated that no significant difference between male and female students' attitude towards mathematics. Most students showed positive attitude towards mathematics, but they lacked intrinsic motivation to engage in mathematics learning (Cho, & Hwang, 2019). It is against this background of the foregoing account that the present study was set out to investigate Students' Attitude towards Mathematics and Academic Performance in Public Senior Secondary Schools Madagali Local Government Area, Adamawa State.

Statement of the Problem

A negative attitude towards mathematics has been found to be a contributing factor towards under-achievement in the subject. The negative attitude in the subject has created a lot of fear and anxiety among students who continue to perform dismally as they lack the interest, curiosity and patience needed for learning and performing related tasks concerning to the subject. Mathematics attitude has been a major focus of researchers towards improved performance of secondary school students in mathematics. Different strategies and technique have been applied to improved students' performance but still the problem of low performance emerges. Students at times exhibit some attitude such as avoidance of mathematics class, lack of self-confidence, decline of interest in mathematics and few others. It may be that the low performance by students in mathematics could be due to attitude. Therefore, there is the need to study the influence of students' attitudes on their academic performance.

Purpose of the Study

The purpose of this study is to determine students' attitude toward mathematics on academic performance in senior secondary schools in Madagali Local Government Area of Adamawa State. The specific objectives are as follows:

i. To determine the attitude of students towards mathematics in public senior secondary schools in Madagali Local Government Area;
ii. To examine if gender differences exist in students' attitudes toward the learning of mathematics in the study area;
iii. To examine the factors influencing students' attitudes towards mathematics in the study area.

Research Questions

The research questions raised for the study are:

i. What is the attitude of students toward mathematics in public senior secondary schools in Madagali Local Government Area?
ii. What are the factors influencing student's attitudes towards Mathematics in Madagali Local Government Area?

Research Hypotheses

The following research hypotheses were formulated to guide the study:

H_{01}: There is no significant difference between students' attitude and their academic performance in mathematics.

H_{02}: There is no significant difference between male and female students' attitude towards mathematics.

Scope of the Study

The study is limited to the attitude of students toward Mathematics and their academic performance in senior secondary schools in Madagali Local Government area of Adamawa State. Five (5) schools were selected out of the seventeen (17) senior secondary schools in Madagali Local Government Area for the research. The Senior Secondary School Students were targeted for the research.

II. RESEARCH METHODOLOGY

This study adopted a descriptive survey research design as it deals with people's views and hence was relevant to the study area. A descriptive survey research design is often used to study people's feelings, thinking and attitudes about specific aspects hence was relevant for this study as attitudes could not be directly measured or observed but were inferred from certain cues which depicted the implicit nature of students' characteristics.

This study targeted all the Senior Secondary School (SSS) students in public secondary schools in Madagali Local Government Area of Adamawa state. The SSS II Students were particularly targeted due to the fact that at that level, they have been exposed to the greater extent of the mathematics curriculum which could have developed and stabilized their attitude towards the subject with time. At such level also, they could almost predict where they would range as far as performance in the subject was concerned.

Stratified sampling was used in selecting the streams depending on how the streams were created so as to consider ability groupings and gender. Purposive sampling techniques was used to select five public secondary schools based on schools that are co-educational and schools with at least one university graduate mathematics teacher. From the sampled schools, using simple random sampling technique two hundred (200) SSII students were selected from the public school for the study.

The researcher developed questionnaire titled "Students' Mathematics Attitude" (SMA). The questionnaire consisted of two sections: Section 'A' sought the personal data of the students while section "B" was the questionnaire items that sought for their attitude toward mathematics. It was designed in modified likert scale type to enable the respondents to express their degree of agreement regarding the items in the questionnaire. The options are Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD).

Piloting was done in different schools apart from the sampled ones. The instrument yielded a reliability index of 0.74 which were determined using Kudder Richardson formula (KR-21). A set of questionnaires representing various attitudes variables or theme was used by the researcher in collecting data. Two hundred (200) questionnaires were distributed by the researcher in which forty (40) was given to each of the five schools in the study area.

Data collected using the questionnaire was presented and analyzed using mean frequency counts and percentage to answer research question 1 and 2 while t-test was used to test all the hypotheses at 0.05 levels of significance.

III. RESULTS AND DISCUSSION

Research Question 1: What is the attitude of students toward mathematics in public senior secondary schools in Madagali Local Government Area?

Table 1: Students' Mean Response Scores to their Attitude towards Mathematics

Statements	Mean	N	Remarks
Mathematics is needed in everyday life	1.95	200	Rejected
There is nothing creative about mathematics, it is just memorizing formula	2.17	200	Rejected
In general, I feel comfortable with mathematics	2.34	200	Rejected
I enjoy learning mathematics	2.14	200	Rejected
Mathematics is a boring subject to me	2.99	200	Accepted
I find mathematics applicable in other subjects	1.40	200	Rejected
I can get a good grade if I work hard	2.99	200	Accepted
Mathematics lessons are interesting when discussing in class with a teacher	2.69	200	Accepted
I work hard in mathematics because I like the subject	2.14	200	Rejected
Mathematics is a very difficult subject	2.99	200	Accepted

Acceptance ($\bar{x}$ is 2.5 and above); Rejection ($\bar{x}$ is less than 2.5)

Table 1 shows the mean score of the attitude of students towards mathematics. The result shows that the students disagree that mathematics is needed in everyday life ($\bar{x}$=1.95). The students disagreed with the statement that there is nothing creative about mathematics, it is just memorizing ($\bar{x} = 2.17$). They also disagreed with the statement that they felt comfortable with mathematics ($\bar{x}$=2.34). The students further disagreed that when asked if when confronted with a mathematics problem and do not know how to solve it, they get confused ($\bar{x}$=2.34). The results also showed that the students disagreed to the fact that they enjoy learning mathematics ($\bar{x}$=2.14). The results shows that the students agreed that mathematics is a boring subject ($\bar{x}$=2.99). It also shows that the respondents did not accept that they find mathematics applicable in other subjects ($\bar{x}$=1.40).

The results also showed that the respondents did not agree that they have no ability or talent to succeed in mathematics ($\bar{x}$=1.13). Also, the responses shows that the students believed that they can get a good grade if they work hard ($\bar{x}$=2.99). The respondents agreed that mathematics lessons are usually interesting when discussing in class with a teacher ($\bar{x}$=2.69). However, they did not agree to the fact that they work hard in mathematics because they like the subject ($\bar{x}$=2.14). Finally, the respondents also agreed that mathematics is a very difficult subject ($\bar{x}$=2.99).

Research Question 2: What are the factors influencing student's attitudes towards Mathematics in Madagali Local Government Area?

Table 2: Students' Mean Response Scores on Factors Influencing their Attitudes towards Mathematics

Items	Mean	N	Remarks
My teacher can make me pass my examination	1.69	200	Rejected
My teachers were never good in mathematics	1.75	200	Rejected
Our mathematics teacher does not use instructional materials to teach us	2.32	200	Rejected
My mathematics teacher discourage me from learning mathematics	1.59	200	Rejected
The boys in my class make fun of me during mathematics classes	2.01	200	Rejected
My teacher discourages girls from offering mathematics	1.17	200	Rejected
I started learning mathematics at home	2.21	200	Rejected
My parents/older siblings assist me in doing mathematics assignment	2.36	200	Rejected

My teacher influence me positively to like mathematics	2.04	200	Rejected
The method used by my teachers discourage me from learning mathematics	2.48	200	Rejected
Solving mathematics problem on the blackboard makes me like mathematics	1.65	200	Rejected
My parents were never good in mathematics	1.54	200	Rejected

Acceptance ($\bar{x}$ is 2.5 and above); Rejection ($\bar{x}$ is less than 2.5)

Table 2 shows students mean response scores on the factors influencing their attitudes towards mathematics. The result shows that; the students disagreed with the statement that the teacher can make them pass their exams ($\bar{x}$=1.69), the students also rejected the assertion that the teachers were never good in mathematics ($\bar{x}$=1.75). The table also shows that the statement that the mathematics teachers did not necessarily use instructional materials to teach was rejected ($\bar{x}$=2.32). It was also rejected that the mathematics teacher discourages them from learning mathematics ($\bar{x}$=1.59). The assertion that the boys in the class make fun of girls during mathematics classes is rejected ($\bar{x}$=2.01) as well as the statement that the teacher discourages girls from offering mathematics ($\bar{x}$=1.17).

Furthermore, it was rejected that some of the students started learning mathematics from home ($\bar{x}$=2.21), it was also rejected that their parents/older siblings assist them in doing mathematics assignment ($\bar{x}$= 2.36). the assertion that the teachers influenced the students positively to like mathematics was also rejected ($\bar{x}$=2.04). It was also rejected that the method used by the teachers discourage students from learning mathematics ($\bar{x}$=2.48). the students also rejected that solving mathematics problem on the blackboard makes them like mathematics ($\bar{x}$=1.65). Finally, the assertion that their parents were not good in mathematics was however rejected ($\bar{x}$=1.54)

Hypothesis H_{01}: There is no significant difference between students', attitude and their academic performance in mathematics

Table 3: Summary of t-test Analysis of Students' Attitude and Performance in Mathematics

Variables	N	Mean	Std. Deviation	df	t-value	p-value	Remark
Students' Attitude	200	3.1131	0.32981	198	1.787	0.852	Rejected
Academic Performance	200	3.1058	0.30078				

Not Significant: (P>0.05)

From Table 3, the result of analysis shows that the t-value (1.787) is higher than the p-value (0.852). Hence, the null hypothesis is rejected. This means that that the alternate hypothesis stating that; "there is a significant difference between students' attitude and their academic performance in mathematics is therefore accepted. The test revealed that there is a significant relationship between students' attitude and their academic performance in mathematics.

Hypothesis H_{02}: There is no significant difference between male and female students' attitude towards mathematics.

Table 4: Summary of t-test Analysis of Students' Responses to their attitude to Mathematics based on Gender

Variables	N	Mean	Std. Deviation	Df	t-value	p-value	Remark
Male	118	3.2647	0.30747	198	0.184	0.854	Accepted
Female	82	3.2583	0.24990				

Not Significant: (P>0.05)

From Table 4, the result of analysis shows that the t-value (0.184) is less than the p-value (0.854). Hence, the null hypothesis is upheld. This means that the hypothesis stating that; "There is no significant difference between the mean responses of male and female students' attitude towards mathematics" is therefore accepted. The test revealed therefore that there is no significant difference between male and female students' attitude towards mathematics.

IV. DISCUSSION

The study sought to investigate the relationship between students' attitude towards mathematics and academic performance in senior secondary schools in Madagali Local Government Area of Adamawa State. It is clear from the result emanating from the research that students attitude do, in fact, have a relatively strong relationship with academic performance in senior secondary schools which is in line with the result of Zan and Martino (2008) who asserted that attitude play a crucial role in learning and performance in mathematics hence determining students' success in the subject.

The result above showed that the attitude of students within the study area to Mathematics were mostly negative; that there is nothing creative about mathematics, it is just memorizing ($\bar{x} = 2.17$), when confronted with a mathematics problem and do not know how to solve it they get confused ($\bar{x}$=2.34), that mathematics is a boring subject ($\bar{x}$=2.99), most of the students' did not find mathematics applicable in other subjects ($\bar{x}$=1.40), the students' believed that they have no ability or talent to succeed in mathematics ($\bar{x}$=1.13), mathematics is a very difficult subject ($\bar{x}$=2.99). However, there were also positive attitudes such as; they believed that they could get a good grade if they work hard ($\bar{x}$=2.99) and they also agreed that mathematics lessons are usually interesting when discussing in class with their teacher ($\bar{x}$=2.69). this result is however not in-line with the result of Ma and Kishor (1997) who found that attitude towards mathematics was positively and reliably related but not strong. However, it was deduced that in-line with Georgiou, Stavrinides & Kalavana (2007), high performance could serve to predict a positive attitude towards mathematics, but such an attitude could not predict stronger performance.

Table 2 however highlighted the different factors influencing students' attitudes towards mathematics. The results show that

the students disagreed that the following factors affect students' attitude towards mathematics; teacher can make them pass their exams, the teachers were never good in mathematics, the mathematics teacher did not necessarily use instructional materials to teach, the mathematics teacher discourages them from learning mathematics, boys in the class make fun of girls during mathematics classes, some of the students started learning mathematics from home, parents/older siblings assist them in doing mathematics assignment. the assertion that the teachers influenced the students positively to like mathematics, and that their parents were not good in mathematics. The results are against the findings of Maria (2012) who asserted that the factors influencing attitudes include; mathematical experiences, perception of mathematics, self-regulation beliefs, anxiety, self efficiency and self concept. Davadas, & Lay, (2017) in their work also asserted that the factors that influence attitude included teaching materials used by teachers, class room management, teacher's content knowledge and personality and other student's opinion about mathematics course.

The t-test analysis of hypothesis one showed that the t-value (0.187) is higher than the p-value (0.852). Hence, the null hypothesis is rejected, hereby revealing that there is a significant relationship between students' attitude and their academic performance in mathematics. This is in-line with Cheung (1998) who discovered a positive relationship between attitude and mathematics performance in his research, this result is further supported by the result of Ma and Kishor (1997) who asserted that attitude towards mathematics and performance in mathematics was positively and reliably related although not a significantly strong connection.

Table 4 however showed that the t-value (0.184) is less than the p-value (0.854). Hence, the null hypothesis is upheld, hereby revealing that there is no significant difference between male and female students' attitude towards mathematics. This result does not however corroborate with that obtained by Mohamed&Waheed, (2011) which revealed that girls have more favourable attitude towards studying mathematics than boys. However, a study by Menis (2003) revealed the opposite, asserting that the attitude of boys towards mathematics was more positive than that of girls. Cheung (2009) suggested that gender differences may vary across levels as his result showed mixed finding regarding the various scales assessed in relation to grades in which the student's learned mathematics.

V. CONCLUSION AND RECOMMENDATION

Based on the research findings the following conclusions were made; there is a significant relationship between students' attitude towards mathematics and their academic performance in Mathematics within Madagali Local Government Area. It is important to understand that despite the low achievement of students in Madagali Local Government Area of Adamawa State, a positive significant relationship between their attitude towards mathematics and performance in mathematics was detected.

The personality and teaching methods of the teacher determines the type of attitude students will develop towards the teacher and towards mathematics thereby influencing students' academic achievement in mathematics. The sex of students helps to shape their attitude towards mathematics. No significant difference was detected between male and female students' attitude towards mathematics. The following recommendations are made based on the findings of this study:

i. There is need for mathematics teachers to help students have positive attitude towards mathematics by helping them to build confidence and by encouraging the belief that everyone can do mathematics.
ii. The Parent Teacher Association (PTA), Philanthropists and the Government should boost the mathematics achievement of students by building mathematics laboratories and providing library facilities in schools.
iii. There is need for parents to encourage and sustain positive attitude towards mathematics in their children by providing the necessary materials for learning mathematics and ensuring that the home is conducive for learning.
iv. Curriculum planners should ensure that they plan the curriculum so as to eliminate certain elements that makes mathematics look abstract and confusing.

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