

SECONDARY SCHOOL STUDENTS' ATTITUDE TOWARDS MATHEMATICS IN SCHOOLS IN ENUGU EAST L.G.A OF ENUGU STATE

BY

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Abstract

This study investigated secondary school students' attitude towards Mathematics in some selected schools in Enugu East L. G. A, Enugu state. The study was borne out of the increasing poor performance of students in Mathematics. It adopted a descriptive survey design. Two research questions and two hypotheses guided the study. An adapted questionnaire on attitude scale called Fennema-Sherman Mathematics Attitude Scale (FSMAS) was used to collect data on students' attitude with respect to students' personal confidence to do Mathematics and perceived usefulness of Mathematics. A sample size of 300 (male = 120 and female = 180) SSS students was randomly sampled from five schools out of ten schools that was used for the study. The research questions were answered with mean score and standard deviation while the hypotheses were tested with t-test statistic at p-value of .05 level of significance. Thereafter, the findings revealed that there is significant difference between male and female students' personal confidence to do Mathematics. More so, there was no significant difference between male and female students' perceived usefulness of Mathematics. Based on the findings, the researchers recommended that Mathematics teachers, parents and all who come in contact with the students should encourage the students to develop more positive attitude towards Mathematics. More importantly, Mathematics teachers should be mindful of their actions, especially when in contact with the students, as this might make or mal students' attitude towards Mathematics.

Key words: Students' attitude and secondary school.

Introduction

There has been an increased demand for the improvement of the students' achievement in Mathematics. This is because knowledge of Mathematics is an essential tool in our society (Mohamed & Waheed, 2011). Disciplines where numbers are predominant and form integral part of Mathematics include: Statistics, Accounts, Arithmetic, Engineering, etc. For example, the earliest civilization of mankind came through mathematical manipulations. Mathematics is a tool that can be used in our daily life to overcome such difficulties as balancing an account, transacting businesses, etc. Due to this, Mathematics has been considered as one of the most important core subjects in a school curriculum. That is why it is made compulsory by the Nigerian National Policy

on Education, (Federal Government of Nigeria FGN, 2014), for all students in both primary and secondary schools. This policy places these two broad objectives on secondary school education:

1. To prepare students for useful living within society and;
2. To prepare students for higher education

Analyzing the broad aims of secondary school education according to the National Policy on Education, Obodo (2004) observed that Mathematics can contribute to the realization of the general aims of education and Mathematics education in particular by:

1. Developing habits of effective critical thinking. This means developing logical reasoning both individually and deductively.
2. Providing competence in the basic skills and understandings for dealing with number and form.
3. Fostering the ability to communicate thought through symbolic expressions.
4. Developing the ability to differentiate between relevant and irrelevant data and to make relevant judgment through the discrimination of values.
5. Developing intellectual independence and aesthetic appreciation and expression.
6. Advancing the cultural and social heritage through its own total physical and social structure.

From the above, it is obvious that Mathematics is very important as envisaged by the National Policy on Education. Hence, Mathematics is seen by society as the foundation of scientific and technological knowledge that is vital in socio-economic development of the nation, (Mbugua, Kibet, Muthaa & Nkonke, 2012). In addition to the economic importance accruable from Mathematics, it better prepares young people for the numeracy demands of modern work place ruled by Information and Communication Technology, (ICT). It also raises the overall skill levels

of the workforce. Again, there are social benefits that are tied to Mathematics such as improving access for larger number of secondary school students to tertiary education and training opportunities and laying stronger foundation to skills for lifelong learning.

However, despite the importance of Mathematics in human development, there has been consistent poor achievement of secondary school students in Mathematics. The students' poor achievement in Mathematics is not just a concern for particular countries but has become a global concern over the years (Siringi, 2010). Mathematics achievement of secondary school students have been very low over the years in the past. For example, according to Malaysian Ministry of Education, only 28.4% of students who have participated in GCE O'level Cambridge examination in 2007 have passed above "C" grade. The results of 2008 also showed similar kind of trend where 66.8% of students getting grades below the expected level (Ministry of Education, 2011). In Kenya, Mathematics and Science at the Kenya Certificate of Secondary Education (KCSE) examinations has not been satisfactory for quite a long time as can be seen in the table below:

Table 1: Kisumu East District KCSE Mathematics Mean score by year

Year	Mean Score
2006	3.2282
2007	3.3691
2008	4.0660

(Republic of Kenya, 2009)

In Nigeria, the situation is the same. According to WACE Chief Examiners' Report (2016), 27% of the students passed Mathematics with "C" grade and above. According to Ramari (2014), achievement in Mathematics has been generally poor due to various factors. Njoroge (2014) also decries the poor achievement in Mathematics despite the fact that it is one of the key subjects expected to turn Nigeria into an industrialized country. Several reasons have been given to account for these variations in achievement in Mathematics. Some authors like Dugger (2014) attribute it

to unfair distribution of qualified teachers in the country; while Odhiambo (2010) states that the root cause of poor achievement in Mathematics, is that Mathematics teachers are poorly prepared. Maliki, Ngban and Ibu (2009) have attributed the poor achievement of students in Mathematics to the fact that the subject is difficult. Some other researches (Ma & Kishor, 2017; Bramlett & Herron, 2019; Papanastasiou, 2016; Nicolaidou & Philippou, 2013; Mohd, Mahmood, & Ismail, 2011), have attributed students' attitude towards Mathematics as a major factor that might influence the achievement of the students.

Attitude is a central part of human identity. Everyday people love, hate, like, dislike, favour, oppose, agree, disagree, argue, persuade etc. All these are evaluative responses to an object. Hence attitudes can be defined as "a summary evaluation of an object of thought" (Bohner & Wänke, 2012). They are inclinations and predispositions that guide an individual's behaviour (Mohamed and Waheed, 2011). According to Multicomponent model of Attitude (Eagly & Chaiken, 1993), attitude towards Mathematics can be measured by beliefs, thoughts, attributes; towards Mathematics (cognitive); feelings and emotions about Mathematics (affective), as well as behavioural information (past events, experiences). There are several factors influencing students' attitude as revealed by available literature. These factors had been classified into three, viz: students related factors; school, teacher & teaching related factors; and home environment & society-related factors.

The students' related factors include students' mathematical achievement score (Köğçe et al, 2009), anxiety towards Mathematics, students' self-efficacy and self-concept, extrinsic motivation (Tahar et al, 2010) and experiences at high school (Klein, 2014; Bobis & Cusworth, 2013). Secondly, the school, teacher & teaching related factors, which include teaching materials used by teacher, teachers' classroom management, teachers' content knowledge and personality, teaching topics with real life enriched examples, other students' opinions about Mathematics

courses (Yilmaz, Altun & Olkun, 2010), teaching methods, reinforcement (Papanastasiou, 2012), receiving private tuition (Köğçe et al, 2009), teachers' beliefs towards Mathematics (Cater & Norwood, 2009) and teachers' attitude toward Mathematics (Ford, 2014, Karp, 2011). Finally, factors from the home environment & society which can affect students' attitude towards Mathematics include: educational background of parents, occupation of parents (Köğçe et al, 2009) and parental expectations (Tobias, 1993). These factors play crucial roles in influencing students' attitude towards Mathematics

According to Yara (2019), attitude of students towards Mathematics has been considered to be a very significant factor underlying their school experience and achievement. That is to say that the attitude students hold towards Mathematics determines how they approach the subject. In many cases, students have been found to approach Mathematics as procedural and rule-oriented. This kind of attitude prevents them from experiencing the importance of Mathematics and the many other approaches that could be used to develop competence in the subject. Clarke, Thomas, and Vidakovic (2019) postulate that attitudes and practices towards the learning of Mathematics are complexly affected by beliefs, emotions, social context and content knowledge. Studies confirm that emotional responses toward Mathematics that are found in students include like and dislike of Mathematics, anxiety associated with Mathematics and self-confidence in relation to learning of Mathematics (Henderson & Rodrigues, 2018). These emotional factors have been found to have an impact on students' performance. That is to say that many students see Mathematics as an uphill task. They learn Mathematics with low enthusiasm and just for the sake of the grade for the next level in their studies.

Students' attitude towards Mathematics and Mathematics learning and their implications for Mathematics instruction have long been a common interest among Mathematics educators (Manoah, Indoshi and Othuon 2011). Attitude towards Mathematics has been considered an

important factor in influencing participation and success in Mathematics. Weidmann and Humphrey (2012) state that investigation into students' Mathematics attitude and perspective not only inform teachers, parents, and administrators about students' needs, but also serves as a catalyst for reform in Mathematics education. There is research evidence showing that students' high achievement in Mathematics is not necessarily positively associated with their attitudes about Mathematics and Mathematics learning. For instance, the results of Third International Mathematics and Science Study (TIMSS) showed that while Japanese students outperformed students from many other countries in Mathematics, they displayed relatively negative attitudes towards Mathematics (Mullis, 2010). The reported gender difference in attitude towards Mathematics influenced some researchers to study some affective variables (feelings, emotions, etc.) as mediators of gender differences in Mathematics achievement (Casey, Nuttal, & Pezaris, 2011).

However, little consensus existed among researchers regarding the influence of affective variables on gender and Mathematics achievement. Some studies reported statistically significant effects of affective variables on the learning of Mathematics (Casey, Nuttal, & Pezaris, 2011; Ho et al 2013, Ma and Kishor, 2017), while others indicated no relationship between attitude variables and Mathematics achievement (Papanastasiou, 2016). Even among those studies that found a significant relationship, there was still a controversy regarding the educational implications of the results. Tymmm (2011) investigated 21,000 students' attitude towards Mathematics and found out that the most important factors were the teachers' and students' academic level, while age, gender and language were weakly associated with attitudes. The students' attitude towards an academic subject is a crucial factor in learning and achievement in that subject. Whether a student views himself or herself as a strong or weak person in a specific subject may be an important factor in his or her academic achievement (Manoah, Indoshi and Othuon, 2011).

To the best of the researchers' knowledge and based on the available literature, there is limited research on gender difference about secondary school students' attitude towards Mathematics in secondary school students in Enugu East. This limitedness has left much to imagination and speculation as to whether there is significant gender difference on the students' attitude towards the study of Mathematics. This study considered it important to determine the students' attitude about Mathematics and if there is a significant gender difference in students' attitude about the study of Mathematics. This was done with specific reference to personal confidence of students to do Mathematics and perceived usefulness of Mathematics in Enugu East L.G.A Enugu State.

Purpose of the study

The main purpose of this study was to determine secondary school students' attitude towards Mathematics in schools in Enugu East L.G.A of Enugu State. Specifically, the study sought to determine:

1. secondary school students' personal confidence towards Mathematics.
2. secondary school students' perceived usefulness of Mathematics.

Research Questions

The researchers formulated the following research questions for the study:

1. How is secondary school students' personal confidence towards learning of Mathematics?
2. What is secondary school students' perceived usefulness of Mathematics?

Research Hypothesis

The researchers formulated this hypothesis to guide the study:

1. There is no significant difference between male and female students' personal confidence towards Mathematics.
2. There is no significant difference between male and female students' perceived usefulness of Mathematics.

Methodology

The study was a quantitative study which adopted a descriptive survey research design. According to Engwa and Ozofofor (2015), descriptive survey research design involves samples of different sub-groups of a population to look at similarities or differences between them at any particular time. Based on this, a descriptive survey research design was considered appropriate for this study since the study sought for the attitude of students towards Mathematics. Attitudes cannot be directly observed, so to measure attitudes one can simply ask the person or use indirect methods of inferring cues to measure implicit attitudes. Usually, direct methods are used in both academic and applied research (Bohner & Wänke, 2012). The population of the study was 4,368 public senior school students (SSS) which comprised 1,693 males and 2,675 female students in Enugu East L.G.A., Enugu state. A purposive sampling technique was used to sample five coeducational schools out of the 10 public secondary schools in the area. In each of the five coeducational schools sampled, a balloting simple random sampling technique was used to sample eight males and 12 females from each of the three classes (SS1, SS2 and SS3). This gave a sample size of 300, made up of 120 males and 180 females. This sample size was considered appropriate since it is in line with Densel (2014) which asserted that if the population of a study is in several thousands, a 30% percent or less sample size is adequate.

The researchers adapted the mostly and widely used attitude scale called Fennema-Sherman Mathematics Attitude Scales(FSMAS), which was developed in (1976), with a group of

nine instruments to measure attitude towards Mathematics. For the sake of this study, two instruments, out of the nine, were used. They are personal confidence of the students to do Mathematics and usefulness of Mathematics as perceived by the students. The questionnaire used was adapted from “A Modified Fennema-Sherman Mathematics Attitude scale” (Mohamed & Waheed, 2011). The FSMAS was on a four-point Likert scale. Decision was taken on the scale given by Jamil (2001) as cited by Mohd, Mahmood, & Ismail (2011). That is, 1.00 – 2.33 (low), 2.34 – 3.66 (medium) and 3.67 – 4.00 (high).

The reliability of the instrument was ensured by administering the instrument to 50 SSS students in Agbani Education zone, who were not part of the study area but have the characteristics of the study population. Data collected in the trial-testing was analyzed using the Cronbach Alpha. The reliability coefficient of the instrument was found to be 0.84. This reliability index is a positively high reliability index. This is an indication that the instrument was reliable for the study.

Data Collection

The researchers visited the various sampled schools to give the questionnaire to SSS students through their teachers. The researchers distributed the FSMAS, through the assistance of the various class teachers in order to avoid Hawthorne’s effects. This was done with the permission of the principal and the copies of the instruments were distributed a period before the break period. The researchers stayed there until the last person finished answering the questions. This gave the researchers the opportunity to attend to issues that required their attention, through the teachers. More so, the researchers had an opportunity of ensuring 100 percent completion and submission of the instrument.

Analysis of Data

The two research questions were answered using mean and standard deviation while the hypotheses were tested with t-test statistic at .05 probability level of significance. The t-test was

used to show the statistical significant difference between male and female students' attitude towards Mathematics.

Results

The data collected with FSMAS were summarized, analyzed and then presented as follows.

Research Question 1: How is secondary school students' personal confidence towards learning of Mathematics?

Table 2: Mean and standard deviation of students' personal confidence towards learning of Mathematics

S/N	Variables	Males			Female		
		Mean scores	Std. Dev	Decision	Mean score	Std. Dev	Decision
1	Most subjects I can handle but I have a tendency to mess up Mathematics	2.98	0.34	Medium	1.65	0.13	Low
2	I am sure that I can learn Mathematics.	3.76	1.01	High	3.05	0.16	Medium
3	I'm not the type to do well in Mathematics	2.54	0.98	Medium	2.56	0.21	Medium
4	Generally I have felt secure about attempting Mathematics.	3.05	0.17	Medium	1.19	0.01	Low
5	Mathematics was my worst subject	1.56	0.12	Low	1.78	0.34	Low
6	I have a lot of self-confidence when it comes to Mathematics	3.89	1.04	High	3.32	0.45	Medium
7	I think I could handle more difficult Mathematics	3.06	0.43	Medium	2.23	0.12	Low
8	I'm no good at Mathematics	1.64	0.40	Low	2.14	0.33	Low
9	For some reason even though I study, Mathematics seems unusually hard for me	3.98	0.56	High	2.56	0.67	Medium
Overall		2.94	0.56	Medium	2.28	0.27	Low

Table 2 shows that the grand mean of male students' personal confidence to do Mathematics has a mean score of 2.94 with a standard deviation of 0.56. This represents medium confidence to do Mathematics. On the other hand, the grand mean of the female students is 2.28 with a standard deviation of 0.27. this implies a low confidence to do Mathematics.

Research Question 2: What is secondary school students' perceived usefulness of Mathematics?

Table 3: Mean and standard deviation on students' perceived usefulness of Mathematics

S/N	Variables	Males		Decision	Female		Decision
		Mean scores	Std. Dev		Mean score	Std. Dev	
1	Mathematics helps me to be self-reliant	2.98	1.31	Medium	1.65	1.11	Low
2	Mathematics makes me more employable	3.76	1.04	High	3.05	1.14	Medium
3	Mathematics increases critical thinking needed in any force place	3.54	0.89	Medium	3.56	1.21	Medium
4	Day-to-day transactions do not need Mathematics	3.05	1.17	Medium	2.19	1.43	Low
5	Mathematics increases my self-esteem as a student	1.56	1.10	Low	2.28	1.33	Low
6	The knowledge of Mathematics does not help me in other subjects	3.89	1.12	High	3.98	1.61	High
7	I think I could handle more difficult task with the help of Mathematics	3.06	1.43	Medium	2.45	1.13	Low
8	Mathematics is needed for admission into higher institution	1.64	1.40	Low	3.45	1.43	Low
9	For some reason even though I study, Mathematics, it is just to fulfil curriculum requirement for graduation	3.98	1.26	High	2.98	1.57	Medium
Overall		3.05	1.19	Medium	2.84	1.33	Medium

From table 3 above, male students' perceived usefulness of Mathematics has a grand mean of 3.05 with a standard deviation of 1.19. This represents medium perception of the usefulness of Mathematics. On the other hand, female students' perceived usefulness of Mathematics has a grand mean of 2.84 with a standard deviation of 1.33. This rates their perceived usefulness of Mathematics as medium.

Personal Confidence towards Mathematics with Respect to Gender

There is no significant difference between male and female students' personal confidence towards Mathematics.

Table 4: t-test Result of male and female students' personal confidence towards Mathematics

	Mean	Score	Standard deviation	T	Df	P	Decision
Gender	Male (120)	Female (180)	Male	Female			
Personal confidence	2.9404	2.2804	.56324	.27309	.342	298	.001 S

Table 4 shows that there is statistically significant difference between the male and female students' personal confidence towards Mathematics. The $t(298) = .342, p = .001, \alpha = .05$. Since the $p < .05$, the hypothesis is rejected, hence, there is a significant difference in male and female student's personal confidence towards Mathematics.

Perceived Usefulness of Mathematics with Respect to Gender

Table 5: t-test Result of male and female students' perceived usefulness of Mathematics

	Mean	Score	Standard deviation	T	Df	P	Decision
Gender	Male (120)	Female (180)	Male	Female			
Overall students' attitude	3.0501	2.8449	1.1944	1.3309	.232	298	.816 NS

Table 5 shows that there is no statistically significant difference between the male and female students' perceived usefulness of Mathematics. The $t(298) = .232, p = .816, \alpha = .05$. Since the $p > .05$, the hypothesis is retained, hence, there is no significant difference in male and female student's perceived usefulness of Mathematics.

Discussion of the Findings

The study established that there is significant difference between male and female students' personal confidence to do Mathematics. With the males' higher mean score of 2.94, it can be concluded that male students have more personal confidence towards Mathematics than the female

students whose mean score is 2.28. On the whole, the study established that both male and female students do not have high personal confidence to do Mathematics. While the males have medium personal confidence, the females have low personal confidence. This lack of high personal confidence might be one of the reasons why they achieve poorly in many Mathematics examinations, (Areelu, 2014). Buttressing this point, Poopola and Ajani, (2011) opined that Mathematics has always been perceived as the most difficult subject in the school curriculum. This has resulted in learners having a negative attitude towards the subject and this attitude seems to have existed from one generation to another.

Furthermore, the study discovered that students' perception of the usefulness of Mathematics is on a medium scale. This was confirmed on table 5 which shows that there is no significant difference between male and female students' perceived usefulness of Mathematics. This was supported by the similar studies done by Mohamed & Waheed, (2011) and Manoah, Indoshi, & Othuon (2011). This may not be too surprising, since every student knows that, at least, a credit pass is required of any student for admission into any higher institution. However, the variation in the mean of the items, notwithstanding, the overall students' perceived usefulness of Mathematics was fairly positive. This agrees with the findings of Mohamed & Waheed, (2011) on similar study.

Conclusions of the Findings

Based on the analyses made above, the following findings were made:

1. There is significant difference between male and female students' personal confidence to do Mathematics. That is, male students have more personal confidence to do Mathematics, with medium rating, than the female students whose rating was low.
2. There is no gender difference on the perceived usefulness of Mathematics. Though the perception of the students on the usefulness of Mathematics was on a medium scale.

Recommendation

Based on the above conclusions, the researchers recommend that:

1. There is need to encourage students, by all those who come in contact with students, to develop positive attitude towards Mathematics.
2. Teachers of Mathematics should be mindful of their personality, especially when in contact with the students. That is, they should not behave in a way perceived as abnormal by the students, as behaving this way might make the students to develop negative attitude towards Mathematics.
3. The usefulness of every topic in Mathematics and/or Mathematics as a whole, should be related to the students by the teachers while teaching them.
4. Parents and all other adults should desist from telling students that Mathematics is a very difficult subject for them.

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