



Students' Gender and Interests as Correlates of Their Achievements in Senior Secondary School Mathematics in Delta State

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ABSTRACT

The recurring under-achievement in mathematics in both internal and external examinations over the years has been a great concern to all stakeholders of education. The place of mathematics in the nation's scientific and technological development coupled with its usefulness in our everyday life calls for means and avenues of ameliorating the problems posed by the deplorable achievement in the subject. The study tried to identify students' gender and attitude as correlates of students' achievement in mathematics. The study was conducted using ex-post facto under descriptive survey design. Eight hundred and eighty four (884) students' in twenty two (25) selected schools in Delta State were selected using the purposive sampling technique. Multiple regression analysis, percentages, means and standard deviation were used to analyse the data and provide answer to the two hypotheses that were raised. The findings revealed that the students' gender and attitude have significant influence on the students' achievement in mathematics. It further revealed that gender of the students has a significant influence on the attitude of students towards mathematics. These findings are of great significance for educational planners, policy makers, parents and teachers. These factors have to be taken into consideration in planning and implementing secondary school improvement programme to create room for remarkable improvement in the academic attainment of senior secondary school students in mathematics.

Keywords: Gender, attitude, Mathematics Achievement

INTRODUCTION

Mathematics is a science subject that philosophers thought would reveal to man the real nature of the universe and its existence in it. Mathematics is fundamentally a subject full of interest and excitement. The difficulty lies in communicating these quantities to the students. For years, educators have searched for ways to more effectively teach mathematics to all students. Mathematics in Nigeria has brought a scourge on students in general. Though, it is well recognized by all, yet not much is being done to solve the problem students' face in mathematics as a subject. Before most people embark on the study of mathematics, certain prejudices are generated in them. Some of which are in-born while others are due to external factors or influence. Salman, Mohammed, Ogunlade and Ayinla (2012) conducted a study on the Causes of Mass Failure in Senior School Certificate Mathematics Examinations as viewed by Secondary School Teachers and Students in Ondo, Nigeria. The Findings indicate that 98% of teachers and 76% of students viewed laziness on the part of students as a major factor responsible for students' mass failure in SSC mathematics examinations while 97% of teachers and 79% of students viewed lack of frequent practice by students as another responsible factor for mass failure in mathematics. Though, a few persons possess innate abilities, a great many of them do not. It is therefore left entirely to external agents especially the environment and teachers to, as it were,

infuse with such a student whatever it takes to awaken the mathematical talent in the majority of students. Moreover, the fear of the subject and the belief that it is very difficult and somewhat meant for geniuses is instilled into the student from the very beginning of their education.

Umoru, S. T. (2011) in a study on difference and problem solving skills in Mathematics defined gender as the distinctions made between words to indicate a difference of sex in the object they denote. Okeke (2008) gave a broad analytical concept which draws out women's role and responsibilities in relation to those of men. According to Okeke, sex refers to those characteristics of males or females which are biologically determined such as possession of penis by males and vagina by females. To Okeke, gender refers to the socially culturally constructed characteristics and roles which are ascribed to males and females in any society. Gender is a major factor that influences career choice and subject interest of students. Okeke (2008) described the male's attributes as bold, aggressive, tactful, economical use of words while the females are fearful, timid, gentle, dull, submissive and talkative. Gender differences have become critical issues of concern around the world most especially to educators and researchers. Hansman, Tyson and Zahidi (2009) reported that there is no country in the world that has yet reached equality between women and men in different critical areas such as in economic participation or education. Gender role differentiations are also encouraged in pictorial illustrations in textbooks which usually portray males as doctors, lawyers, engineers, professors while the females are seen as nurses, cooks, mothers etc. This creates mental picture in the mind of the readers of the role expectation from the society (Babajide, 2010). Parents at home are not left out in this gender stereotype; parents buy ball for the male child and "teddy bear" for the female child. Teachers also encourage gender stereotype by giving different treatment to males and females in class. Teachers often go further to give different career guidance to males and females. The society also frowns at seeing a male cooking or female climbing a tree. The males are also assigned leadership positions and females are to assist or to follow, since Nigeria gained her independence, she had never produced a female president or governor (Ezendu and Obi, 2013).

It is essential that all male and female students receive proper mathematics education. Research reports are not explicit on the effect of gender on achievement. A large scale study in the U.S.A. by Hyde & Mertz (2009) revealed that girls have reached parity with boys in mathematics performance, including at high school where a gap existed in earlier decades. They affirmed that girls are doing better than boys even for tasks that require complex problem solving. Zember and Blume (2011) reported that most studies show that girls perform better than boys in schools. This corroborate an earlier report by Dayioglu and Turut - asit (2004) in a study, saw that girls, though enter Turkish universities with low grades, but upon their entry, out perform their male counterparts.

However, Ogunkunle (2007), in a study carried out in Nigeria titled effects of gender on mathematics achievement of students in constructivist and non-constructivists groups in secondary school, *ABACUS*, established that there is a significant difference in favor of males and another part in favor of the females. Mansory (2010). reported that a number of male students in grade six of some schools in Afghanistan have achieved higher success than females (average tests scores of boys' are 52% and girls' 46%). Mathematics has been a difficult subject for many students to effectively learn. Female students' achievement in mathematics is widely recognized as a national concern. In society where culture associates professions strictly with men and there are gender-based stereotypical division of professions and roles particularly those in male dominated societies, this will affect girls' and women's future career choices. Girls lowered interest in math impact on their math participation and significant impact on their workforce. These ideas stunt girls' development and progression (Watt, 2007). According to Watt (2007) girls have less confidence in mathematics ability than boys even when no gender differences are measured in mathematic. Self-confidence usually brings changes in learning achievements. There is difference in confidence level between male and female students.

Abiam and Odok (2006) found no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics in Nigerian schools. They however found the existence of a weak significant relationship in Geometry and Trigonometry. Abubakar and Oguguo (2011) in their comparison, found no significant difference between the performance of boys and girls. This agrees with Uduosoro (2011) who found no significant difference between the performance of boys and girls. Stereotypes about math performance have always been in favour of boys. Such stereotypes still hold true among parents, educators, teachers, peers and even students themselves. Those common held beliefs have affected females' enrollment in math-related courses and careers as well as females performance in math tests (Burkley, M., Parker, J., Stermer, S.P., & Burkley, E., 2010).

Oxford Advance Learner's Dictionary (7th Edition) defines attitude as "the way that you think and feel about somebody or something". Muellerleile (2005) defined attitude as an approach, temperament, sensation, situation etc. with regards to a person or thing: inclination or course, especially of the mind. Similarly, Gul and Arshad (2012) asserted that attitude is a hypothetical construct that indicates an individual's likes and dislikes towards an item. It may be positive, negative or neutral. Furthermore, Yara (2009), in a study to determine the relationship between teachers' attitude and students' academic achievement in

Mathematics in some selected senior secondary schools in Southwestern Nigeria, affirmed that attitude is a concept that is concerned with an individual's way of life, i.e. a way of thinking, acting and behaving. It has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates and the entire school system. Akinyemi (2009) stated that attitude are required through learning and can be changed through persuasion using variety of techniques. Attitude, once established, helps to shape the experiences the individual has with an object, subject or person. Edermir (2009) affirmed that attitude, whether positive or negative, affect learning in science. However, it is well known that a negative attitude towards a certain subject makes learning or future-learning difficult. Therefore, helping students develop positive attitude towards Biology course should be considered an important step in science education.

The competence gain in the study of Mathematics is widely used in all spheres of human life. Mathematics plays a key role in shaping how individuals deal with the various spheres of private, social, and civil life (Anthony & Walshaw, 2009). This justifies the compulsion of the study of the subject by all students who go through basic and secondary education in most countries. Mathematics is therefore a core subject at these levels of education in Nigeria. It is regrettable, therefore, that in the contemporary times many students struggle with Mathematics and perform abysmally low in their final examinations in most jurisdictions. In Nigeria, students' performance in Mathematics at the Senior Secondary School has not been encouraging of late. Candidates are reported to exhibit poor understanding of Mathematical concepts and are unable to form the appropriate Mathematical models which could be tackled with the requisite skills" (WAEC 2011). It has also been realised that many students have developed negative attitude towards the study of Mathematics as a result of mass failure of students of the subject. It is an irrefutable fact that the successfulness of learning the subject is contingent on myriad of factors. School, classroom, student and teacher factors all impinge on the learning of Mathematics. In particular, the seriousness or otherwise attached to the learning of Mathematics invariably affects students' performance in their final examinations (Mensah, J. K., Okyere M. and Kuranchie, A, 2013). The indispensable role of attitude in the learning of Mathematics has garnered the attention of educational researchers and Mathematics educators for a very long time. Hence, literature is replete with empirical evidence on the relationship between students' attitude and their academic achievements in Mathematics. Students who are interested in their learning activities are likely to report high competence beliefs, high achievement levels and choose high school courses that are related to their interests (Watt, H. M. G., Shapka, J. D., Morris, Z. A., Durik, A. M., Keating, D. P., & Eccles, J. S. 2012). Given this great importance of students' interest for their learning

processes it is highly problematic that interest substantially declines during secondary school. This decline occurs particularly in mathematics (Frenzel, Goetz, Pekrun, & Watt, 2010;).

Attitude can also be gender related. There are many who hold the view that boys do better in Mathematics than girls. This belief tends to affect the attitude of girls towards Mathematics. Farooq and Shah (2008) in a study of secondary school students in Pakistan found that there was no significant difference in confidence of male and female students towards Mathematics at secondary school level. They rather found that students' success in Mathematics depended on attitude towards the subject. Nonetheless, some studies have found gender difference in students' confidence in Mathematics.

Mathematics is also considered as very important and largely masculine subject. However there are many studies that suggest that there is no significant difference between attitude towards mathematics among male and female students (Mohd et al, 2011; Köğce et al, 2009). In a research, Lawsha M. and Hussain W. (2011), found that the students' attitude towards mathematics do not have significant difference between male and female students. Hence there is no gender gap in attitudes. In a study carried out by Mahanta and Mofidul Islam (2012) on attitude of secondary students towards mathematics and its relationship to achievement in mathematics, the analysis of data shows that 37% boys considered mathematics to be a hard subject whereas 39.2% girls considered mathematic to be a hard subject. 60% boys considered mathematics to be helpful in the development of mind whereas 58% girls think so.

It is against this background that this study therefore intends to examine student's attitude and gender as correlates of their achievements in senior secondary school mathematics in delta state

Statement of the Problem

Mathematics is widely acknowledged in Nigeria as a very important subject, yet it is a subject that most students dread so much and would never offered if they were to have their way. Most of the times, students complain of the unexciting atmosphere in the classroom during mathematics period which may be as a result of students' gender and attitude to mathematics. This has made the need for improved performance in mathematics in the secondary level grown over the years. The products of the educational system are expected to meet the manpower needs for scientific and technological development of Nigeria. However, this cannot be realized with the perennial poor performance in mathematics. The classroom teacher is the curriculum implementer. Consequently, the success or failure of students in examinations depends largely on the characteristics exhibited in the process of teaching and learning. The study was therefore, to examine student's attitude and gender as correlates of their achievements in senior secondary school mathematics in delta state

Hypotheses

The following null hypothesis was formulated for testing in the study at 0.5 level of significance.

1. There is no significant difference in the attitude of male and female students towards mathematics.
2. There is no significant difference in the achievement score of male and female students in mathematics.

METHODOLOGY

This study employed the expo-facto research type. The independent variable in the study is the students' gender and attitude. The dependent variable was the students' academic achievement in senior secondary school students' mathematics for the 2013/2014 academic session. The population of the study comprised all the three hundred and thirty three (355) senior secondary schools in the three (3) educational zones of Delta state with students enrolment of eighty four thousand four hundred and eighty six (84,284) students. The sample of the study was the Senior Secondary School two (SS 2) drawn from the three (3) educational zones in Delta State. The purposive sampling technique was employed for the study. The subjects used must have satisfied the following condition:

The students in SS2 have completed SS1 scheme of work.

From the existing three hundred and thirty three (355) senior secondary schools a total of twenty two (25) schools were chosen. This represented 7.0% of the total school population. In the study, two instruments were used, these are:

- a. Students Attitude Questionnaire on Senior Secondary School (SAQSSS). The questionnaire was in two parts. Section A contained demographic data like position in the family, student's gender, educational qualification of parents and so on. Section B consists of twenty (20) statements to elicit information about the respondents' attitude. The statements were prepared in a four-part Likert scale such as strongly agree (4 points), agree (3 points), disagree (2 points) strongly disagree (1 point).
- b. The students' results ranging from excellent, credit, passes and fail were also used in the study.

Data analysis was carried out using both the descriptive and inferential statistics. The descriptive statistics included percentages, means and standard deviation. While inferential statistics included the t-test and multiple regression analysis.

RESULTS AND DISCUSSION

The results of the findings of data analysis were presented according to the socio demographic, research questions and hypotheses which guided the study.

Socio – Demographic Information

Table 1

Gender distribution of the students

	Male	Female	
Frequency	470	414	884
Percentage	53.2	46.8	

Out of the seven hundred and seventy four (884) students identified, four hundred and seventy (470) were males, which formed 53.2% while four hundred and fourteen (414) were females which formed 46.8%. School age females in Delta State have mostly taken to petty trading and most of these females have gone into early marriage thereby jeopardizing their chances of going to school. This could be as a result of some prevailing factors. Some of these factors as enumerated by Okeke (2008), (Ezendu and Obi, 2013) and others. These studies further went on to explain gender differences in students learning outcomes especially in science subject (Where females are grossly under represented.).

Hypothesis 1

There is no significant difference in the achievement scores of male and female students in mathematics.

Table 10

Summary of T-Test of Achievement Score of Male and Female Students.

Gender	N	Mean	Std. Deviation	t-value	Df	Sig.
Male	429	45.00	12.088	1.419	772	.156
Female	345	43.80	11.289			

Table 10 shows that the t-calculated value (1.419) is less than the t- table value (1.645) at $P < 0.05$. Therefore, the hypothesis is accepted. That is, there no significant difference in the achievement scores of male and female students in mathematics. Although, the achievement score of male students is higher than that of the female students with the mean value of 45.00 and 43.80 respectively.

Hypothesis one is not rejected, it is rather retained since the calculated t-value is less than t-table value at $P < 0.05$ level of significance. This simply means that there is no significant difference in the achievement score of male and female students in mathematics. The findings of this study conformed with the view of Abiam and Odok (2006), Abubakar and Oguguo (2011) and Uduosoro (2011). The findings of the present study are very much expected as mathematics has been viewed as an abstract, difficult and a male subject meant for selected few. This is why those common held beliefs have affected females' enrollment in math-related courses and careers as well as females performance in math tests (Burkley, M., Parker, J., Stermer, S.P., & Burkley, E., 2010). Moreover, girls appear to internalize the prevailing expectations, then give up when it comes to the study of science in general and mathematics in particular. In their study, Hydea & Mertz (2009) revealed that girls have reached parity with boys in mathematics performance, including at high school where a gap existed in earlier decades. They affirmed that girls are doing better than boys even for tasks that require complex problem solving. Ogunkunle (2007), Mansory (2010) and Watt, (2007), in their study revealed that there persist in our society, however, a common belief that boys are better at mathematics. Although over the decade there is a substantial improvement in the achievement level for female students. However, the perception that boys are better at mathematics than girls remains a seemingly intractable trait of our society. We must look to the classroom and students factor for cause of gender inequality.

Hypothesis 2

There is no significant difference in the attitude of male and female students towards mathematics.

Table 11. Summary of t-test of Attitude of Students towards Mathematics

Gender	N	Mean	Std. Deviation	t-value	Df	Sig.
Male	429	54.4545	9.65072	1.754	772	.080
Female	345	53.2174	9.87902			

Results in table 11 shows that the t-calculated value (1.754) is less than the t-table (1.645). Hence, the hypothesis is rejected. This means that there is significant difference in the attitude of male female students towards mathematics. The mean score of the male and female students of 54.45 and 53.22 respectively, shows that male students attitude towards mathematics is not more favourable compared to that of females. Hypothesis two is rejected since t-calculated is greater than the t-table value at $P < 0.05$ level of significance. This means that there is significant difference in the attitude of male and female students towards mathematics. This finding was in line with research study conducted by Mahanta and Mofidul Islam (2012). They adduced that attitude towards a subject greatly affects achievement. However male students have better disposition towards mathematics than their female counterparts as evidenced in their mean score. However, Farooq and Shah (2008), Mohd et al, (2011), Kögce et al, (2009) and Lawsha M. and Hussain W. (2011) found that there is no significant difference between attitude towards mathematics among male and female students. This research work investigated students' characteristics as correlates of their achievement in senior secondary mathematics.

The researcher finally arrived at the following results.

- a. Gender of the students does not affect the performance of students in mathematics in Delta State. There was not much difference in the performance of female students compared to that of male students.
- b. Gender of the students had some correlation on the attitude of the students towards mathematics. Also, male students had better disposition toward mathematics than male student.

- c. Students' gender does not have significant influence on the achievement of the students in mathematics.
- d. There is significant influence on the attitude of male and female students towards mathematics.

CONCLUSION AND RECOMMENDATIONS

The researcher has shown the impact of students' gender and attitude on students' achievement in senior secondary school mathematics. It was observed that the perennial failure in mathematics was as a result of some identified students characteristics.

Sequel to the findings, recommendations were made thus:

- a. Mathematics specialist teachers should be drafted to primary school where they would lay a necessary foundation for higher mathematical and computational skills in secondary schools. A situation where one teacher in a primary school class handles all the subjects in the time-table does not augur well for both in-depth study and subject matter coverage in the various teaching subject especially mathematics.
- b. Encouragement of employment opportunity in the state should be upheld in the area of mathematics and sciences so that fresh graduates of mathematics or allied courses are injected into the mainstream of teaching. This follow from the fact that teacher experience can significantly influence the students to form positive attitude towards mathematics
- c. Though there was no significant difference in the achievement scores of male and female students in mathematics. This has some implication in education practice. The government is therefore requested to improve the working conditions of mathematics teachers through the provision of infrastructural facilities and materials. This undoubtedly, will attract diligent and more qualified teachers; otherwise, teachers may show apathy towards their teaching. The government should brace up to its responsibility of organizing seminars, workshops, conferences, refresher courses on regular basis where serving mathematics teachers are acquainted with the emergent transformation of teaching and learning resource such as the use of computers, compact discs, digital video discs, satellite communication and the internet. For teachers, it could lead to rethinking, teaching and learning strategies, greater expectation of their pupils, more opportunities for individual teaching and group work and better understanding of their students learning. This will in no doubt make for better improvement of students' performance in mathematics.
- d. From the mean score of the students, it could be seen that the performance of the students generally was poor. There is a need for the government as a matter of urgency to intervene by providing all necessary materials for both the teacher and students so as to improve the students' performance in mathematics.
- e. Nigerian mathematics curriculum and textbooks used by teachers and students should be reviewed to reflect current development in science and technology.
- f. Parents should encourage their wards in schools by providing them with the necessary materials, which facilitate learning of mathematics. They can even go a long way to get the service of specialist teachers of mathematics to offer remedial and tutorial teachings to their wards that are deficient or slow in learning to stimulate and encourage such learners.
- g. To bridge the gap between student attitude to and performance in mathematics, more attention must be directed towards the processes and practices of teaching at the primary and secondary school level. Factors that are amenable to intervention and improvement such as are identified in the study should be subjected to necessary intervention programmes that are designed with the aim of boosting pupils' morale, developing positive attitude and enhancing students' performance in the subject.
- h. Also, the data from attitudes scale indicate that a negative attitude regarding the nature of mathematics does not preclude a positive achievement in mathematics. At different times an individual can feel insecure about on aspect of mathematics and confidence about their ability to

handle mathematics in the classroom. This means a student could be keen about doing mathematics but not have the necessary background to succeed.

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