Gender Disparity in Mathematics Performance among Secondary School Students in Adamawa State, Nigeria

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ABSTRACT

As mathematics is the bed rock of Science and Technology, the nature of women's low participation gives room for a lot of concern. This study aims at analysing the gender disparity in mathematics performance. The population of this study comprises all Senior Secondary Schools Students in Adamawa State, Nigeria. Five schools were randomly selected for the study. Take-a-pick lottery method was used. In this method, the individuals are assigned numbers which are written on pieces of paper folded properly. Data for the study were collected through collation of West African Examination Council (WAEC) results of students in mathematics from the selected schools (male and female separately for a period of five years). Chi-square statistics was used to analyse the result collated while contingency coefficient test was used for further analysis to justify hypotheses. The findings reveal that gender has nothing to do with students' performance in mathematics, rather hard work.

Keywords: *Gender, students' performance, mathematics and Girl-Child Education*

INTRODUCTION

Gender bias has posed a lot of problems and great concern to educationists. Girls and women from middle and upper class parents are at advantage position when it comes to the provision of education, especially where there are boys and girls in the family. As for the upper class parents, they stand a chance of educating both boys and girls. On the other hand, parents that are poor are likely not to be able to send all their children to school.

Thus, when it comes to who is to go to school, girls and women are placed at a disadvantage. The usual reason is that, girls and women are taken for marriage and therefore, it is more important to educate the boy-child. This trend is prominent in the Northern part of Nigeria (NTI, 2004). Now the "big" question is in giving equal opportunities to both boys and girls, who among them will perform? Some schools of thought (NTI, 2004) attribute to background of a child, in the sense that a child from upper class parents will have access to qualitative education and will be exposed to a lot of things a poor parent cannot reach. However, it is not always true that children from middle and upper class perform better and achieve more than those poor and uneducated parents, despite their exposures. It is rather possible

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to have children from high socio-economic status not performing well in school. Children of the poor and uneducated or of low socio-economic status parents may perform well in school and consequently attain high educational status on the other hand. Ale (1989) states that mathematics is one of the basic ingredients to understand science and technology. He further argues that the gap that exists between the developed and the developing countries had their roots in mathematics accomplishments. Kuku (1989) declares that a nation cannot develop meaningful road to technology without mathematics. It suffices to say that for any meaningful road to technological development of any country, its citizenry must have a sound knowledge of qualitative and analytical subjects like mathematics, physics and others since the social and economic development of any country largely depend on them. Bassey (1985) says that mathematics has been exemplified from the fact that "mathematics is the door and key to science and technology". However, in Nigerian society, the understanding of this science subject at the Secondary School Certificate Examination (SSCE) is misplaced.

The teachers besides gender may be the key players; a teacher who is harsh will tend to discourage the students. More so, students' perception of the subject (mathematics) would always influence their school academic performance. The fact remains that apathy among the students is their greatest enemy which Interferes with their performances. Mathematics as the bed rock of science and technology must be significantly developed in order to meet up with the global practice and expected technological need of the nation and of its citizenry. Odilli (1986) postulates that mathematics is the queen of the science and no nation can hope to achieve any measure of scientific or technological advancement and development without proper foundation in school mathematics, but unfortunately, mathematics is one of the most poorly taught, widely hated and abysmally understood subject in the Nigerian school system. Most secondary school students particularly the girls do run away from mathematics. The postulation of girls' students avoiding or running away from mathematics might have borne out of negative conceptions from other people that mathematics is difficult or it is abstract. This motivates the researchers to analyse the level of performance of male and female students of mathematics at Senior Secondary Certificate Examination level.

Gender differential, according to Ezendu (1997) in her paper on gender stereotypism, is a situation where differential performances interest of boys and girls in science, technology and mathematics education are experienced due to cultural bias in the role expected of each gender. This gender stereotypism starts from the home; therefore the home is responsible for gender stereotypism. She further stated that "the home provides the child with models which the child can identify". The home also transmits behavioural traits, attributes and value system which are basic to specific roles. Since the home is the immediate environment of the child, it has important role to play in moulding the character and behaviour of the child to a desired direction, and this later in life affects his or her performance at

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schools which is originated from the early foundation. In another development, Ezendu condemned gender bias as she stated "boys are bought toys like motor cars, aeroplanes, tricycles and bicycles, while girls are bought toys like babies, train how to feed babies and learn how to carry babies". According to her this training went ahead to influence their future career. She added that parents create this gender differences at home and the society follows suit, that "some jobs are documented as being for boys, for example, mechanics, plumber, doctors, drivers and electricians" which required good sense of mathematics for one to excel. Otherwise, jobs like nurse, shop assistants and primary school teachers etc, which required less application of mathematics are meant for women.

According to Smith (2008), it has been widely demonstrated (in Gilligan, 1982 and Spender, 1982) that boys typically attract more of the teacher's attention than girls in coeducational classrooms. Dale Spender (1982) has documented this generalization in her book entitled "Invisible Woman". Spender found that girls, especially in the junior years, are reluctant to express their view points in front of boys. Gill (1991) reports that higher teacher-male students' interaction was more common when the teacher was inexperienced. More experienced teachers adopted strategies in the classroom to reduce the imbalance in interaction between boys and girls. Nevertheless, boys still receive more teacher attention than girls. The reluctance of girls to speak up in the class does not necessarily mean that girls are disadvantaged in terms of their classroom learning or educational achievement.

In an extensive classroom observational study in South Australian schools, Gill (1992) reports that boys asked more trivial questions merely to gain the teacher's attention, whereas, girls were more likely to seek clarification for their learning problems from friends or their partners. Rowe (1988) administers items from standardized mathematics achievement tests on three occasions over a two-year period and found no gender differences in achievement based on the type of mathematics class. This study was conducted in a Victorian high school in Australia. On the quality of teachers, Odili (1986) states that an adequate higher qualification develops self confidence in the teachers and service as a source of inspiration to his students. Therefore the qualification of the teacher contributes greatly to the performance of his students, in that the teacher imparts his understanding to the learners. According to Ezewu (1987), where qualified mathematics teachers are available to teach the subject, the concern shifts to how the subject is being taught.

In preparing students for senior secondary school certificate examination, (SSCE), teachers are supposed to develop in the students necessary skills, knowledge and behaviour which WAEC Examination assesses. For students to succeed in mathematics, teacher's mastery of the subject matter is essential else the teacher who is deficient in the subject matter is likely to skip "difficult" part of the syllabus which in turn will affect the students' performances. The poor performance of students in mathematics examinations may be due to poor staffing of school, lack of qualified teachers, inadequate instructional materials, insufficient class rooms and

a host of others among good and conducive environments. Egbugara (1983) declared that students' interest is one of the strongest factors affecting their performance in mathematics in public examinations. This may be related to their perception of the subjects relevant to their future career. The materialistic nature of our society has forced students to become nonchalant to education because of the low level of immediate returns. As rightly put by Ishaku (1996), "mathematics requires hard work" and when this is lacking, failure is bound to set in.

Most teachers of mathematics are engulfed by their teacher centered method of teaching rather than the student centered method. Ishaku (1996) remarked that teacher centered methods seem to dominate the classroom teaching/learning situations in mathematics. These methods do not give room for students' critical thinking but rather a mere speculator who swallowed the whole "story" hook, line and sinker. This defect could arise from faulty teacher preparation. On the other hand, if teachers are well qualified and the appropriate teaching/learning environment is provided but yet the performance does not improve, then there may be inadequate supervision from the school administration or relevant ministerial supervisory body.

Material factors such as teaching aids, instructional materials like; text books, well equipped laboratory, good library and so on are in short supply in our secondary schools. Teachers hardly go to their classes with teaching aids thereby making mathematics abstract. Until recently, the most popular mathematics text books available to secondary school students were Clark and although written by foreign authors, had indicated that these popular texts may not present much comprehension difficulty to Nigerian students (Okpala, 1982). However, Ishaku (1996) had queried on possible linguistic problems and the unfamiliarity of the background from which illustrations, examples and questions are drawn. Fortunately, there are books now written by local authors to take care of these problems. The concern is that whether these books are readily available for students to use.

Family and environmental factors are yet issues on students' performance in mathematics. Onyenoho and Ekweue (2003) observe that 68% of the parents did not want their females to study science. They see mathematics, science and technology as subject for masculine gender. This has affected their female children in choice of career. The problem facing women in the society today includes restricted mobility outside the home. Others include inequality of males and females in the family, emotions of females towards mathematics and the teacher's attitudes and methods of teaching the subjects. No wonder why Kabutu and Ochoyi (2004) argue that a good trainer will adjust his or her styles and cater for the students; the trainer should use different teaching strategies. Furthermore, Nigerian school system needs teachers who will encourage girls to break the yolk of this traditional gender role expectations and stereotype. Kabutu and Ochoyi (2004) opine that although gender gaps appeared in science education in developed countries, the gap appears widest in developing and worst in countries with minority populations such as refugee camps and internally displaced persons of which only few chosen, go to school.

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The gender imbalance in favour of male, in education enrolment has its beginning from traditional education where, boys were looked up to as potential leaders and head of families. Parents did not find it worthwhile interesting in females in the name of education. This is because females are not permanent members of the family of their birth. The best in education is for the boys since they will remain in the family. This trend has remained unchanged from generation passed. It is against this background that the 1969 National Curriculum Conference called for an intensification of propaganda by all available means for girls and women to receive science education in the country. The following hypotheses shall be tested at 0.05% level of significance in this study:

1) There is no significant difference in the performance of male and female students from the selected schools.
2) There is no significant difference in the opinion of male and female students about factors that encourage gender disparity in students' performance in mathematics at the secondary school level
3) There is no significant difference in the opinion of male and female students about strategies for removing gender disparity in students' performance in mathematics.

PARTICIPANTS AND PROCEDURE

This study shows a proper understanding of the present situation on ground and how this situation affects performance of mathematics at senior secondary school level. As such, it is a descriptive research, that is to say, a "research which specified the nature of a given phenomenon". The researcher uses proportional stratified random sampling which involves the selection of individuals in a sample from the subgroups in proportion to the size of each subgroup in the population. Anderson (1990) proposes that when the target population consists of a number of subgroups or strata that may differ in random characteristics being studied, it is desirable to use stratified random sampling. Stratified random sampling is the process of selecting a sample in such a way that identified subgroup called strata in the population are represented in the same proportion that they exist in the population.

Stratified random is also used in selecting equalized sample from each of a number of subgroup comparison is required. Whether one selects equal number of individuals from the strata in the sample or use proportional sampling, depends on the nature of research. If the emphasis is on the types of differences among the strata, equal number of the cases will be selected from each. However, if the characteristics of the entire population are the main concern, then proportional sampling is more appropriate. The major advantage of stratified sampling is that of guaranteed representation of defined groups in the population. The sample for this study is made up of students (male and female) selected at random from five (5) secondary schools. Take-a-pick lottery method was used. In this method, the individuals are assigned numbers which are written on pieces of paper folded

properly. These would be put in a container and properly mixed. The required numbers of individual are then picked. This method may be laborious, and the mixing may not be thorough (NTI, 2008) statistical methods in education. Data for the study were collected through collation of West African Examination Council (WAEC) results of students in mathematics from the selected schools (male and female separately for a period of five years). This study used Chi-square to analyse the result collated and used contingency coefficient test for further analysis to justify hypotheses 2 and 3. Each hypothesis was tested at 0.05 (or 5%) level of significance.

RESULTS AND DISCUSSION

Table 1 shows the summary of males and females who pass mathematics in five (5) different schools sampled over a-five year period. The vertical column total indicates the total number of students who passed mathematics in a particular year. For instance, in 2003, a total of 631 students passed mathematics. In 2004, 758 students passed. In 2005, 2006 and 2007, the number of students that passed stood as follows: 828, 914 and 963 respectively. Table 1 gives room for table 1.1 which is constructed using proportional stratified random sampling to choose 250 students out of a total of 4094. Each cell in table 1.1 below is filled by computing, Tables 1.0 and 1.1 were analysed using chi-square and contingency coefficient and the result presented as in table 1.3 in appendix. The degree of freedom of stood at (R-1)(C-1), where r is the number of rows and c the number of columns. The critical value for chi-square is 9.49 and the calculated value is 0.75. By all indications, the calculated chi-square value is less than the critical value and as such the null hypothesis is accepted. In this case one can say that there is no significant difference between gender and performance. The implication is that, performance in mathematics does not depend on gender. From the analysis of the data collected the following findings were revealed:

1. There exist on significant relationship between gender and students' performance in mathematics.
2. Private schools performed far better than public schools in mathematics examinations.
3. The number of females students enrolled is not up to the male counterparts in public schools but fairly good in private schools.
4. The higher the population of the school, the lower the performance of students in mathematics examinations.

Table 1: Summary of the number of students who passed mathematics from the five different schools sampled in Adamawa state for the period of five (5) years i.e. from 2003 to 2007.

Gender			**Years**			**Total**
	2003	2004	2005	2006	2007	
Male	425	514	515	555	586	2595
Female	206	244	313	359	377	1499
Total	631	758	828	914	963	4094

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Table 1.1: Observed frequency table

Gender			**Years**			**Total**
	2003	2004	2005	2006	2007	
Male	26	31	31	34	36	158
Female	13	15	19	22	23	092
Total	39	46	50	56	59	250

Table 1.2: Expected frequency table

Gender			**Years**			**Total**
	2003	2004	2005	2006	2007	
Male	25	29	32	35	37	158
Female	14	17	18	21	22	092
Total	39	46	50	56	59	250

Table 1.3

Observed (O)	Expected (E)	O- E	$(O-E)^2$	X^2 =	$C = \sqrt{\frac{X^2}{N+X^2}}$
26	25	1	1	0.04	0.01
31	29	2	4	0.14	0.02
31	32	-1	1	0.03	0.01
34	35	-1	1	0.03	0.01
36	37	-1	1	0.03	0.01
13	14	-1	1	0.03	0.01
15	17	-2	4	0.07	0.02
19	18	1	1	0.06	0.02
22	21	1	1	0.05	0.01
23	22	1	1	0.05	0.01
250	250	0	0	0.75	0.16

CONCLUSION AND RECOMMENDATIONS

It is obvious from our research that performance is independent of gender in mathematics. It suffices to say that, females can perform very well or even better given the opportunity and the required materials and enabling environment. The major problem in our society especially in the Northern parts of Nigeria, girl child education was not considered as something indispensable, this tend to discourage the females from making efforts. From this research however, no significant relationship exists between gender and performance in mathematics. An in-depth study should be carried out on the correlation between performance in highly populated schools and schools with optimum population. This will go a long way to improving the study and learning of mathematics among secondary schools students with a view to intimating the ministry of education and the other policy makers on the class room population and performance. A case study of correlation between performance in mathematics and performance in other subjects' areas should be probed into in order to place emphasis on the number of periods to allot mathematics

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and other science subjects. Also, a comparative study on performance of students in mathematics from science schools and those of conventional secondary schools should be carried out.

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