Bangladesh Journal of Extension Education *ISSN 1011-3916*
Volume 20, No. 1&2, 2008:117-122 *Research Article*

Mathematics in Nigerian Secondary Schools: Are Boys Better than Girls?

F.E. Aburime[1]

Abstract

This study set out to investigate gender differences in mathematics achievement in secondary schools. The study specifically seeks to determine whether males are superior to females in mathematics achievement. All secondary school students in Edo State of Nigeria constitute the population of study. Out of 287 secondary schools, Ebelle Secondary School, Ebelle and Momodu College, Agbede were chosen at random, and junior secondary school two (JS2) was randomly selected for the study. The result showed that there was no significant difference between the mathematics achievement of male and female students in Edo State secondary schools in Nigeria. Females in Nigeria are therefore encouraged to come out, in full force, to study mathematics, which is the bedrock of national development, especially in science, technology and commerce.

Keywords*: Mathematics, boys and girls, Nigeria*

Introduction

Gender issues in mathematics and education

There is a lot of argument concerning the idea that males are better that females in mathematics. All over the world, researchers are struggling to find out the real truth. In the 1990s, American researchers, Zambo and Follman (1994:22) reported significant gender related differences in mathematics word problem solving ability in favour of males. Byrnes, Hong, and Xing (1997:51) reported that, "math is sex-typed as a male domain." Seegers and Boekaerts (1996), Forgasz, Leder and Gardner (1999) confirm that boys do better in mathematics achievement and participation. While reviewing the work of Fennema and Leder (1990), Becker (1991:157) expressed the opinion that, "Fennema rightly concludes that we do not have justice in mathematics education; females are not learning and participating in mathematics at the same level as are males." An excerpt from Rathgeber (1995) claims the existence of considerable evidence that girls receive less intensive training in science and mathematics at the primary and secondary school levels. Teachers often give answers directly to girls but provide boys with further information to enable them to solve problems for themselves. The Gambia Department of State for Education (undated) reports that, "it is statistically proven that in The Gambia the level of participation of (girls in) education is not comparable to that of boys." The Department believes that "it is of vital importance… that girls are given assistance in their education for the benefit of all." In

[1] Senior Lecturer and Acting Head of Department at Benson Idahosa University, Benin City, Nigeria.

Nigeria, Osakwe (1990) pointed out that previous research efforts lead to the general belief that girls have an edge over boys in verbal ability. Osakwe linked the general tendency for boys to dominate in mathematics to computation. Okeke (1997p.27) calls for gender equity, especially in fields as important as science, technology and mathematics. Okeke recalls that, "President Nyerere of Tanzania in advancing argument for integrating women in development stated that no one walks far or fast with only one leg. The two legs are needed." Ani, Esin and Inyang (2001: 242) report that, "There is a low level of women participation in scientific, technological and mathematics activities. Nwafor (2002: 67) warns that, "With over 50% of her population made of females, Nigeria cannot afford the real cost of ignoring gender issues in their formal education system." Gender issues in mathematics have attracted many other researchers, including Brinkworth (1998), Eya and Mgbo (1997), Hart (1992), Morrow and Morrow (1993), Sadker and Sadker (1994) and Schimitau (1996).

Statement of the problem

With a teeming and virile population of females, Nigeria cannot afford to frustrate her women and girls in a vital area like educational development. Focusing on mathematics education, which is a basis for scientific and technological development, Nigeria needs the full cooperation of her female citizens to team up with their male counterpart and study mathematics seriously. Nigerian females seem to shy away from mathematics as if it is purely a male domain. This inferiority complex cannot be fought by using only words. Research investigation is also needed.

Purpose of the study

The study sets out to find out if, indeed, males are better than females in mathematics at the secondary school level in Nigeria, especially Edo State where this scientific study was carried out.

Research hypothesis

The following null hypothesis was developed for testing: There is no significant difference between the mathematics achievement of male students and the mathematics achievement of female students.

Methodology

Population, sample, instrument, data collection and analysis techniques have been discussed under research methodology.

Population

All students in 287 secondary schools in Edo State of Nigeria form the population of this research study.

Sample

The 287 secondary schools in Edo State were numbered from 001 to 287. Then, using a table of random numbers, the numbers 028 and 129 representing Ebelle Secondary School, Ebelle, and Momodu College, Agbede respectively were chosen. Six equal pieces of paper were cut out of a foolscap sheet. On each paper was written the name of one class, so that six classes –JS1, JS2, JS3, SS1, SS2 and SS3 appeared on the six pieces of paper (JS= Junior Secondary and SS= Senior Secondary). After folding the pieces of paper, one of them, JS2, was chosen at random. Thus, the research was carried out in

JS2 class, which was chosen by simple ballot. The following table (Table 1) shows the male and female numbers in JS2 in Ebelle Secondary School, Ebelle, and Momodu College, Agbede, both in Edo State of Nigeria.

Table 1. Male and female students in Ebelle secondary school and Momodu college junior secondary school two (JS2) class

	Male	Female	Total
Ebelle Secondary School	36	30	66
Momodu College	30	12	42
Total	66	42	108

Instrument

The instrument for this research consisted of a testing instrument, Mathematics Achievement Test (MAT). MAT was a multiple-choice type of achievement test, which was used for both pretest and posttest. To construct MAT, a table of specifications (or test blueprint) was drawn up for sixty-eight test items as in table 2 below.

Table 2. Table of specifications for JS2 mathematics achievement test

Subject areas	Recall of information	Understanding concepts	Application of concepts	Total
Geometry	5	13	8	26
Algebra	3	7	4	14
Statistics	3	7	4	14
Number and Numeration	3	7	4	14
Total	14	34	20	68

Face and content validation, then item analysis followed writing of test items. The face and content validation reduced the items from sixty-eight to sixty-one while item analysis reduced the test items from sixty-one to fifty-two. The surviving test items were administered to thirty-one students in a pilot test. The students were in JS2 in Obiaruku Grammar School, Obiaruku, Nigeria. Kuder-Richardson formula (KR21) was applied to scores in order to measure internal consistency. The internal consistency coefficient was 0.79. It was considered high enough to accept MAT for research. A test-retest of students, with an interval of three weeks, yielded scores that were paired and analysed to obtain 0.82 as test-retest reliability coefficient for MAT. Again, this was high enough to accept MAT as a reliable research instrument.

Data collection and analysis techniques

Data collection started with pretest administered to students in both male and female groups. The pretest scores were carefully kept for future use. After pretest, ten weeks of teaching followed. After the pretest and ten weeks of teaching, a posttest was given to all students in male group as well as female group. The posttest scores were collected for analysis in conjunction with pretest scores. It is noteworthy that the validated Mathematics Achievement Test (MAT) was used for both pretest and posttest with several precautions. The first precaution was that MAT was administered to students

in two versions. The second version of MAT was a rearrangement of the numbers and alternative answers in the first version. Thus, question number 5 with correct answer E in the first version of MAT could become question number 23 with correct answer C in the second version of MAT. The second precaution was to minimize the chance of obtaining fake scores from students who merely copied from their neighbours. To carry out this precaution, question papers were given to students in a checkerboard fashion (see Table 3 below).

Table 3. Checkerboard arrangement of question papers

1	2	1	2	1	2	1	2
2	1	2	1	2	1	2	1
1	2	1	2	1	2	1	2
2	1	2	1	2	1	2	1
1	2	1	2	1	2	1	2

1= First Version Test, 2= Second Version Test

Checkerboard arrangement of question papers guarantees that students writing a different version of test surround every student. The third precaution was that no student wrote the same version of MAT for pretest and posttest. Statistical analysis of pretest and posttest scores was carried out by the computer, using t test (see Tables 4 and 5 below).

Findings and Discussion

Table 4 below shows the t test analysis of pretest scores. At pretest level, the mean score (7.9242) of male students was higher that the mean score (7.4048) of female students. But the difference between the mean scores was not significant at .05 level because the calculated t value (0.748) was less than the critical t value (1.985). Thus, at the pretest level, the null hypothesis is accepted. There is no significant difference between the mathematics achievement of male students and the mathematics achievement of female students. The next table, table 5, displays another t test analysis; this time of posttest scores.

Table 4. t Test analysis of pretest scores of male and female students in Ebelle secondary school and Momodu college JS2 class

Group	Number	Mean	Standard deviation	df	Calculated t value	Critical t value	Decision
Male	66	7.9242	4.1298				Accept Null
Female	42	7.4048	3.071	107	0.748*	1.985	Hypothesis

**= Not significant at .05 level*

Table 5. t-Test analysis of posttest scores of male and female students in Ebelle secondary school and Momodu college JS2 class

Group	Number	Mean	Standard deviation	df	Calculated t value	critical t value	Decision
Male	66	11.2878	5.7360				Accept Null
Female	42	9.8095	3.9445	107	1.586*	1.985	Hypothesis

***** = *Not significant at .05 level*

From posttest scores, the mean (11.2878) of male students is higher that the mean (9.8095) of female students. Again, the difference between these means is not significant at .05 level. The null hypothesis is again accepted because the calculated value of t (1.586) was less than the critical t value (1.985). There is no significant difference between the mathematics achievement of male students and the mathematics achievement of female students.

Conclusion

From the above findings and discussion, the difference between the mathematics achievement of male students and the mathematics achievement of female students is not significant at both the pretest level and the posttest level of the research study. This shows that the male and female students were, academically, of equal strength as far as mathematics achievement is concerned. Thus, this research does not support the idea of male superiority in mathematics over their female counterpart. The study shows that, as far as mathematics achievement is concerned, secondary school boys and girls are equally matched. This is a scientific proof against the widespread idea that mathematics is a male domain. The result of this experiment is an encouragement to females to study mathematics wholeheartedly. Females should not forget, or underestimate, their importance. The more educated our females are in all subjects, the better for the country in particular and the world as a whole. The following recommendations emanate from the research study.

- Girls should not believe that they are inferior to boys in mathematics.
- Parents, teachers and government authorities should encourage girls to face the study of mathematics squarely
- Lectures and seminars should be organised to effect full female participation in national struggle and development through studying mathematics, and mathematics related subjects, side by side with their male colleagues.
- Our girls, and our women for that matter, must not be allowed to bury their talents in mathematics. Let Nigerian females come out in full force, divest themselves of inferiority complex in mathematics, and move their country and humanity forward through their conscientious contributions in mathematics, and mathematics related subjects.

References

Ani, O., Esin, J., and Inyang, A. 2001. Gender disparity in science, technology and mathematics in Nigeria. *The Paragon 1* (1) 238-245.

Backer, J.R. 1991. Justice in mathematics education: Reaching beyond equity. *Journal for Research in Mathematics Education, 22* (2), 157-161.

Brinkworth, P.C. 1998. Multicultural and gender equity in the mathematics classroom: The gift of diversity. *The Australian Mathematics Teacher*, 54(1), 32.

Byrnes, J.P. Hong, L. and Xing, S. 1997. Gender difference on the math subtest of the scholastic aptitude test may be culture-specific. *Education Studies in Mathematics, 34* (1) 49-66

Eya, P.E. and Mgbo, A. 1997. Performance of boys and girls in junior school certificate integrated science, mathematics and introductory technology. In Badmus, G.A. and Ocho, L.O. (Eds.), *Science, Mathematics and Technology Education in Nigeria.* Lagos: The Nigerian Academy of Education.

Fennema, E. and Leder, G. C. (Eds.) 1990. *Mathematics and Gender.* New York; Teacher College Press.

Forgasz, H. J., Leder, G. C. and Gardner, P. L. 1999. The Fennema-Sherman mathematics as a male domain scale re-examined. *Journal for Research in Mathematics Education, 30* (3) 342-348.

The Gambia Department of State for Education (no date supplied). *Scholarship Trust Fund for Girls Operational Manual.* Retrieved July 20, 2006 from.

<http://www.statehouse.gm/kids/girlchild/opmanual.htm>

Hart, L. 1992. Two generations of feminist thinking, a review of gender and mathematics: An international perspective. *Journal of Research in Mathematics Education.* 23(1), 79-83.

Morrow, C. and Morrow, J. 1993. Whose math is it, anyway? Giving girls a chance to take of their math learning. *Initiatives.* 55, 49-52.

Nwafor, O.M. 2002. Analysis of gender issues in Nigeria formal education system. *Journal of the World Council for Curriculum and Instruction Nigeria Chapter 3*(2) 56-69.

Okeke, E. 1997. Women and girls participation in science, technology and mathematics: Educators as facilitators. In Badmus, G.A. and Ocho, L. O. (Eds), *Science, Mathematics and Technology Education in Nigeria*. Lagos: The Nigerian Academy of Education.

Osakwe, E. O. 1990. Effects of instructional modes on student's spatial conceptualisation in social studies. Unpublished Ph.D. Thesis, University of Ibadan.

Rathgeber, E. 1995. Schooling for what? Education and career opportunities for women in science, technology, and engineering. In *Missing Links: Science and Technology for Sustainable and Equitable Development*. Retrieved June 24. 2004 from <http://www.developmentbookshop .com/book.phtml?isbn=1853392898>

Sadker, M. and Sadker, D. 1994. *Failing at Fairness: How American Schools Cheat Girls.* New York: Charles Scribner and Sons.

Schimitau, J. 1996. Mathematics and gender: A Case for relational understanding. *Focus on Learning Problems in Mathematics.* 18(1,2 and 3).

Seegers, G. and Boekaerts, M. 1996. Gender-related differences in self referenced cognitions in relation to mathematics. *Journal for Research in Mathematics Education. 27* (2), 215.

Zambo, R. and Follman, J. 1994. Gender-realed differences in problem solving at the 6th and 8th grade levels. *Focus on Learning Problem in Mathematics. 16* (2) 22.