

FACTORS INFLUENCING STUDENTS' ACADEMIC PERFORMANCE IN SENIOR SECONDARY SCHOOLS MATHEMATICS IN UKWUANI L.G.A, DELTA STATE, NIGERIA.

Oliweh Ifeanyi Solomon

Integrated Science Department,
College of Education, Agbor.
Delta State, Nigeria.

Abstract

This study is aimed to investigate the factors influencing the poor performance of students and to establish the strategies that can be adopted to improve performance in Mathematics by students in Ukwuani L.G.A, Delta State secondary schools in Nigeria. The study determined the school based factors that affect students' performance in Mathematics in secondary schools, socio-cultural factors that affect them and their personal factors that affect their performance in Mathematics, and established the strategies that can be adopted to improve performance in Mathematics. Descriptive survey research design was adopted for the study. The target population was of 367 SSS 3 and sample of 100 students in 10 secondary schools with 55 males and 45 females, 10 Mathematics teachers and 5 Head teachers. The data for the research was collected by use of three questionnaires; students, teachers and head teachers. Factors contributing to poor performance include inadequate teaching/learning materials, lack of interest/confidence and Language used by the teachers. Improving on these factors and sensitization of the local community to discard practices which prohibit student's effective participation in learning mathematics could improve performance in Mathematics. It is anticipated that the findings of this study will give curriculum developers new insights into emerging issues on performance and influence the Ministry of Education in the state and at the federal level on policy formulation that will enhance the achievements in secondary school Mathematics. Students are also expected to benefit from the findings; because improved mathematics performance will give them opportunities to pursue science related courses in higher institutions of learning and middle level colleges.

Key Terms: Factors, Mathematics, Students, Performance.

According to M. E. Aina (2000), the importance of mathematics as a subject that is basic to all scientific and technological development is of a universal acceptance to all in the field of education. She noted that not only is it distasteful to them, they also both dread and perform poorly in it; the truth of this has been confirmed by a number of studies. For example, Osibodu (2007) in a study noted a regular high rate of failure at the school certificate level. It is not uncommon to find students who wished to pursue Engineering. Again, M. E. Aina, (2000) said that scientific or technological courses of study unable to do so because they lack the minimum requirement in mathematics that will qualify them to pursue such courses. Definitely, there are problems in the learning and teaching of mathematics in our classrooms today, M. E. Aina (2000). She asserted that this is an issue of concern to all in education industry generally but particularly to those in mathematics education.

Justice, Osei, Nkum, (2015) believes that Educators, Trainers, and Researchers have long been interested in exploring variables contributing effectively to the quality of performance of learners. According to Crosnoe, Johnson & Elder, (2004) these variables are inside or outside schools and affect students' quality of academic

achievement in Mathematics. According to Crosnoe, Johnson & Elder, (2004), these factors may be termed as student factors, family factors, school factors and peer factors. Justice, Osei, Nkum, (2015), It is therefore, an irrefutable fact that the successfulness of learning the Mathematics subject is contingent on myriad of factors. Schools, students and teacher's factors all impinge on the learning of mathematics.

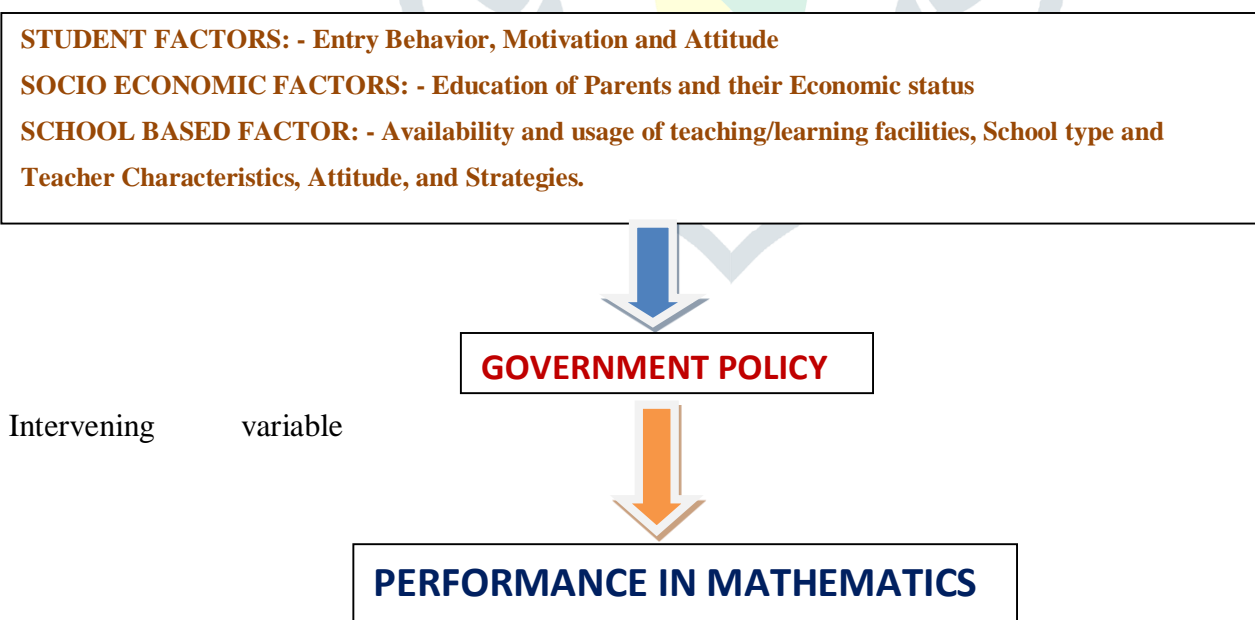
Chaman, Beswick & Callingham, (2014) consider the impacts of each of Mathematics anxiety and attitude to Mathematics and parental involvement on Mathematics achievement, before considering the mediating influences of gender and culture. Finally, we present a tentative model of the interactions of all of the variables considered based on the literature review, Chaman, Beswick & Callingham, (2014).

Generally, the consistent poor performance in the subject has been attributed to such factors as negative attitude of students and teachers to mathematics, lack of motivation in teachers; non-availability of instructional aids et cetera. Some of these factors are examined below.

It is against these that this paper seeks to analyze some factors affecting students' mathematics performance in Secondary schools in Delta State of Nigeria. Despite the important role that Mathematics plays in society, Aduda (2003). He found that there has always been poor performance in the subject at national examinations.

Performance in Mathematics as reflected by the SSCE results has remained poor over the years (Post Primary Education Board, Asaba (2010). Hence, the need to investigate the factors contributing to students' poor performance in Mathematics at SSCE Examinations in Ukwuani L.G.A, Delta State of Nigeria, so that poor performance in Mathematics can be reversed. Mbugua, Kibet, Muthaa & Nkonke, (2012) highlighted that the student factors, social cultural factors and school based factors were investigated as Independent Variables, and Achievement in Mathematics as the Dependent Variable.

Factors



Dependent Variables

Figure 1: Factors Contributing to Poor Achievement in Mathematics

Objectives of the Study

Objectives of the study were to;

- i) Determine the school based factors that affect students performance in senior secondary school Mathematics.
- ii) Establish student's personal factors that affect their performance in Mathematics in secondary schools.
- iii) Establish strategies that can be adopted to improve performance of senior secondary schools students in mathematics

Research Questions

- i. What are the factors affecting the performance of students in Mathematics by gender?
- ii. What are the attitudes of teachers towards the teaching of mathematics in secondary schools?
- iii. Is there any difference between the achievements of male and their female counterpart in mathematics

Methodology

The populations of this study were of 367 SSS 3 students. The student questionnaire comprised sections on demographic data with items such as gender, age, secondary school entry marks, socio-economic and cultural, school based factors with items such as method of teaching by teachers, availability of teaching / learning materials, academic qualification, and teaching experience of Mathematics teachers and motivation. Mathematics teacher's and head teacher's questionnaires had sections on demographic data items such as gender, age, academic qualification, and teaching experience. Socio-economic and cultural and school based factors with items such as method of teaching, availability of teaching/learning materials, workload and motivation and finally strategies to be adopted to improve achievement in Mathematics. Descriptive statistics were used to analyze the obtained data. The hypotheses were tested at 0.05 level of significant, t-test was used to validate the results.

Results and Discussion:

The following results were obtained;

Table 1: Gender of Participants

| Respondents | Male (%) | Female (%) |
|----------------------|----------|------------|
| Students | 54.6 | 45.4 |
| Mathematics teachers | 71.0 | 29.0 |
| Head teachers | 72.0 | 28.0 |

The table 1 shows that the male Student respondents are (262)54.6% while female students are (218)45.4%. The mathematics teachers revealed that (7)71% participated against the female (3)29% and Head teachers (4)72% male while (1)28% female participated in the responses.

Table 2: Factors Affecting Performance of Students in Mathematics by Gender.

| Factors | Students by gender | | | |
|---|--------------------|-----------|-------|------------|
| | Boys | % of Boys | Girls | % of Girls |
| Lack of interest and Confidence | 53 | 27.2 | 48 | 27.9 |
| Inadequate textbooks and learning resources | 90 | 46.2 | 87 | 50.6 |
| Language used by the teachers | 52 | 26.7 | 37 | 21.5 |
| Total | 195 | 100 | 172 | 100 |

Table 2 indicates that lack of interest and confidence in mathematics has an average percentage by both boys and girls of 53(27.7%) and 48(27.9%) respectively. Language used by the teacher seems to affect boys more than it does to girls. This is evidenced by 52(26.7%) of boys who cited that language used by the teacher affects their performance in mathematics which is higher among boys at 26.7% compared to girls at 21.5%. Majority of the students cited inadequate mathematics textbooks and learning resources as factors that affect mathematics performance. According to UNESCO (2009), Resources such as textbooks are useful to learners for revision and doing home work. Such activities have been known to improve performance in mathematics and other subjects in general. Textbooks at school library are motivators for students to engage in personal study and hence improved outcomes in subjects such as mathematics. These findings are in consonance with the findings of Yadar (2007) and the report by UNESCO (2008) which opined that teaching/learning materials such as textbooks, classrooms, teaching aids (chalk, board, ruler and protractor), stationeries and laboratories affect academic performance of the learners, [Olatunde, Otieno, \(2010\)](#). Also, the result, of the findings agreed with that of Mutai (2006) who asserts that learning is strengthened when there are enough reference materials such as textbooks, exercise books, teaching aids, classrooms and the academic achievement illustrates per excellence the correct use of these materials. The implication of this result is that provision of conducive classrooms, laboratories and other teaching/learning resources can positively change teachers' attitude to the teaching of mathematics and make the subject to be very interesting, meaningful and exciting to the students and hence will encourage mathematical exploration and manipulation by students which will keep them alive and thinking and will also help them realize the applications of Mathematics, [Olatunde, Otieno, \(2010\)](#).

Differences between Boys and Girls in Mathematics Performance

[The study involved 195 boys and 172 girls](#) Table 6 shows the scores, frequencies and means obtained in the MT in probability and statistics by gender. The test item contained six probability and statistics questions, testing on mathematics problem solving and computational skills. [Iji, Agbo-Egwu & Adikwu, \(2014\)](#) noted that statistics is a branch of mathematics involving the study of data presentation, measures of central tendency, measures of dispersion, graphical presentation of data and probability (Federal Ministry of Education, 2007). According to the National Teachers Institute (2009) Statistics and probability are an indispensable aspect of Mathematics that affects every facet of human Endeavour.

Table 3: Performance of Male and Female students in mathematics

| Schools | Gender | Test | Scores and Frequency | | | | | | | Mean | SD |
|------------|--------|------|----------------------|-----|-----|------|-------|-------|-------|-------|------|
| | | M | 0-2 | 3-5 | 6-8 | 9-11 | 12-14 | 15-17 | 18-20 | | |
| Single Sex | Male | F | 1 | 20 | 18 | 26 | 27 | 18 | 40 | 12.44 | 5.29 |
| | Female | F | 4 | 15 | 12 | 42 | 20 | 30 | 22 | 11.9 | 4.92 |
| Mixed | Male | F | 5 | 12 | 24 | 10 | 6 | 8 | 10 | 9.56 | 5.40 |
| | Female | F | 10 | 13 | 17 | 5 | 8 | 4 | 3 | 7.6 | 5.07 |

M=Marks, F= Frequency, SD=Standard deviation

The maximum possible score on the test was 20. Results show that in mixed schools, male students (boys) performed better (mean=9.56) than female students (girls) (mean=7.6); in single sex schools, male students performed better (mean=12.44) than female students (mean=11.90). In general, the male students had a mean of 11.48 with a standard deviation of 3.67 while female students had a mean of 10.81 with a standard deviation of 3.33 as shown in table 3. The overall picture is that boys outperformed girls in the test as they had a higher mean score (12.44) in statistics and probability test, compared to girls who had a mean score of 11.90. Therefore, a t-test was carried out to determine if this difference was significant.

Table 6.2: Students' T-value for the Mathematics (Probability and statistics) Test.

| Gender | N | Mean | SD | Std. Error Mean | Mean Differences | T-value | Df | 2-tail Significant |
|--------|-----|-------|-------|-----------------|------------------|---------|-----|--------------------|
| Male | 195 | 12.44 | 3.703 | 0.263 | 0.54 | 4.843 | 427 | .001 |
| Female | 172 | 11.90 | 3.331 | 0.413 | | | | |

The research question under investigation is whether students' gender influences performance in Mathematics significantly or not. The t-test revealed that there was significant difference in performance based on gender as shown in table 6.2. Students' T-test for equality of means showed significant variation in achievement by gender of the student ($t=4.843$, $p<0.05$ at 95% confidence level). In these findings, male students' perform better than girls in statistics and probability in Ukwuani L.G.A. Despite the importance of mathematics to students and society at large, the general achievement in Secondary school mathematics has more often than not been affected by students' poor performance in the Statistics section of secondary mathematics examinations over the years in Nigeria. The National Examinations Council Annual Report (NECO, 2010 and 2017) has indicated that achievement in the statistics section of the Secondary mathematics paper was low among the secondary school students. The research findings agreed with the findings of Rukangu (2000) that boys tend to perform better than girls in mathematics. But differ from findings by Miheso (2002), who observed that girls performed better than boys in Nairobi region of Kenya.

Summary

The findings were summarized in an effort to achieve the study objectives. The study revealed the following findings that are summarized as per the research objectives.

a) Gender-Related Factors that Influence Students' Performance in Mathematics:

Consistent and sizeable gender differences were detected across the five attitude scales examined. It was the boys who voiced a stronger acceptance of mathematics. Boys were more interested in mathematics, found learning mathematics related tasks easier, showed a more pronounced interest in starting a career in mathematics. On average; boys had a stronger affinity and interest towards mathematics and rated mathematics to be more beneficial than their female classmates. It would, therefore, appear justified to summarize that on average, boys had a stronger affinity and interest towards mathematics. Teacher's gender had little effect on mathematics performance. Language used in instructing mathematics affected boys more than it did to girls.

b) Performance of Male and Female students in mathematics

Gender had a remarkably intense effect on mathematics achievement with gender differences favouring boys (mean of boys = 11.48 and mean of girls = 10.81). As a result, gender was strongly associated with mathematics achievement ($r = 0.9880$, $p < 0.05$). The finding that gender differences in mathematics achievement were, in general, always in favour of boys or male – dominated classes. There was a significant difference between gender and students' performance in mathematics.

Conclusions from the Study

The following conclusions were drawn from the study:

The present research findings have provided sufficient evidence that girls had formed negative attitudes towards the subject and they have little or no interest for it. Boys have a positive attitude towards learning of mathematics. While there are differences among individuals in learning mathematics, little is based on gender as most differences cut across all gender. It is, therefore, possible to lift the performance of girls and reduce the gap by moderating the few areas responsible. The school administration has not prioritized learning of mathematics by purchasing the relevant resources to equip the teaching of mathematics. Mathematics is not so demanding in resources and all that is required are the key simple resources like mathematics textbooks, mathematics model and mathematical instruments. Majority of the secondary school boys and girls in Ukwuani L.G.A indicated that:

(a) Mathematics helps them make decisions in their future career.

(b) Careers they are likely to pursue require mathematics. This is indicative that they realized the role of mathematics.

It is concluded that there exist factors that affect secondary school students' achievements in mathematics in Ukwuani L.G.A, Delta State of Nigeria. Girls were seen to be performing lower than boys in mathematics in the secondary schools. The socio-economic status of parents is an important factor influencing the participation and achievements of students in mathematics. However, they do not play their roles effectively since they are not conversant with school programmes. Finally, the larger society still perceives that mathematics teachers to an extent determined the success or failure of secondary school students based on their attitudes in teaching in mathematics.

Recommendations

The study therefore recommends that:

i. Since gender differences exist in mathematics, remedial activities which focus on differences in mathematics performance to be enhanced. Mathematics teaching and evaluation strategies should be gender bias free. This will make males and females to see themselves as equal, capable of competing and collaborating in school activities.

ii. Mathematics textbooks and learning resources are very important and a necessary components in mathematics classrooms.

Suggestions for Further Research

- 1) The study was carried out on the factors affecting students' mathematics performance in some selected secondary schools in Ukwuani L.G.A, Delta State. Thus, this study needs to be replicated in other parts of Nigeria to enable greater generalization.
- 2) The researcher used descriptive survey design in the study, therefore, other researchers are recommended to use experimental design or other methods.
- 3) The study evaluated the aspect of factors affecting students' performance in mathematics, in the secondary schools. Another study can be carried out to investigate gender differences in specific mathematical strands.
- 4) Research should be carried out to determine the policy in terms of time allocation and balanced content.

References

- Aduda, D. (2003, February 27). Kenya Certificate of Secondary Education, Examination Results Released by Minister of Education. *Daily Nation*, Nairobi: Nation Media Group Ltd.
- Ajai, J.T., & Imoko, I.I. (2015). Gender differences in mathematics achievement and retention scores: A case of problem-based learning method. *International Journal of Research in Education and Science (IJRES)*, 1(1), 45- 50.
- Asante, K.O. (2010). *Sex differences in mathematics performance among senior highs Students in Ghana*. Retrieved from <http://www.faqs.org/periodicals/21012/2187713381>.
- Besant, K. C. (1995). Factors associated with types of mathematics anxiety in college students. *Journal for Research in Mathematics Education*, 26 (4), 327-345.
- Borg, W. R. S., & Gall, M. D. (2007). *Education Research. An Introduction*. 4th Edition. New York: Longman Publishers.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people Learn: Brain Mind, Experience and school: Expanded Edition*. Washington, D.C: National Academy Press.
- Bryden, M. P. (1979). *Evidence of sex Related Differences in Cerebral Organization*. New York: Academic Press. National Focus Group on Teaching of Mathematics.
- Burton, L. (1996). *Gender and Mathematics: An International Perspective*. London: Cassel Educational Limited.
- Catsambig, S. (1994). The path to Math Gender and Racial Ethnic Differences in Mathematics Participation. *Sociology of Education*, 67(3), 199-215.
- Chen, W-B., & Gregory, A. (2010). Parental involvement as a protective factor during the transition to high school. *The Journal of Educational Research*, 103, 53– 62. [CrossRefGoogle Scholar](#)
- Cockcroft, H. (1982). *Mathematics Counts. Report on Committee of Enquiry into Teaching Mathematics in Schools*. London: Her Majesty Stationery Office.
- Cohen, L., & Manion, L. (1994). *Research Methods in Education (4th Ed)*. London:
- Considine, G., & Zappala, G. (2002). *Influence of social and economic disadvantage*
- Derek, H., & Fiona, T. (2007). *Key concepts in teaching primary mathematics*. Amazon: SAGE Publication Ltd.
- Federal Ministry of Education. (2007). *Senior Secondary Education Curriculum (Mathematics*

- for SSI – 3). Abuja: Nigerian Educational Research And Development Council (NERDC).
- Federation of African Women Education. (1998). *Students attitude towards mathematics in Malawi*.
- Halpern, D. F. (2000). *Sex Differences in Cognitive Abilities*. (3rd Ed.) Mahwah, NJ: Lawrence Erlbaum Associates.
- Howes, E. V. (2002). *Connecting girls and science. Constructivism, feminism, and education reform*. New York: Teachers College Press.
- Johnson, D. A., & Rising, G. N. (1972). *Guidelines for teaching mathematics*. Belmont, CA: Wadsworth publishing company, Inc.
- Kering, P. (2001, January 18). Kericho scores higher in 2000 KCPE. The Daily Nation p. 7.
- Kerlinger, F. N. (1985). *Foundations of Behavioural Research* (2nd Edition). New York: Holt Rinehart & Wilson.
- Kothari, C. R. (2004). *Research methodology. Methods and techniques* (2nd edn) New Delhi: New Age International (P) Ltd Publishers.
- Makau, B. M. (1997). Measuring and analyzing gender differences in primary and secondary schools. In *Research Framework*. Academy Science Publishers, Nairobi, Kenya, 2, 8– 15.
- Mbuthia, A. N. (2011). *Differences in Mathematics Performance among Secondary*
- Miheso, M. K. (2002). *Factors affecting mathematics performance among*
- Miheso, M.O. (2011). Proficiency in Pedagogical Content Knowledge. Secondary School Mathematics' Teachers Interpretations Of Student Problem Solving Strategies in Kenya VDM. Educational Journal, 5, 20-25.
- National Examination Council, (2008). KCSE. *Examination Candidate* Munda, S. W.; Tanui, E.
- National Examination Council. (2007) *NECO Examination*
- National Examination Council. (2010) *NECO Examination*
- National Examination Council. (2015) *NECO Examination*
- National Examination Council. (2017) *NECO Examination*
- O'Connor, M. M., Kanja, C. G. & Baba, T. (2004). *The open ended teaching approach in mathematics* Education, Nairobi: SMASSE PROJECT.
- Osibodu, B. (2007) – Modern Mathematics for Nigerian Schools Blessing or a Bane. A Study of the Problems and Issues of Maths. Teaching in Nigeria, NERC, Lagos, 27-28.
- Rukangu, S.M. (2000). Students development of spatial ability in Mathematics. An Issue of Learning Environment in Selected Secondary Schools in Kenya. Unpublished Ph.D Thesis, Kenyatta University.
- School Students*. Unpublished M.ED Thesis Kenyatta University, Nairobi, Kenya.
- Twoli, N.W. (1986). Sex Differences in Science Achievement among secondary school students in Kenya. Flinders University, South Australia Unpublished Ph.D Thesis. Flinders University.
- Yadar, K. (2007). *Teaching of life sciences*. New Delhi: Anmol Publication. Ltd India.