

GENDER DIFFERENTIAL MATHEMATICS ACHIEVEMENT OF STUDENTS IN SELECTED SENIOR SECONDARY SCHOOLS IN DELTA STATE, NIGERIA

Oliweh Ifeanyi Solomon,¹ Dr. Oyem Ifeanyi M.²

¹Department of Integrated Science, College of Education, Agbor, Nigeria.

²Department of Integrated Science, College of Education, Agbor, Nigeria

Email: ifeanyisolomon62@gmail.com

Abstract

This study focused on the Gender Differences in Mathematics Achievement of Students in Selected Secondary Schools in Delta State, Nigeria. The stratified random sampling technique was used. The population for the study was 800 students' in secondary schools. One research question and hypothesis was formulated to guide the study. Data were collected and analyzed using the Statistical Package for the Social Science (SPSS) according to the research objectives of the study. The hypotheses were tested at 0.05 level of significance. Research hypothesis was analyzed using t-test analysis for mean variance. The decision was based on the t-test p-value of the models. The homogeneity of the variance is supported by Levene's test for equality of variance. The results of the hypothesis show that there was no significant difference in the performance of boys and girls students in Mathematics.

Keywords: Gender, Teachers, Science, Performance.

Introduction

Mathematics is perceived as the foundation for scientific and technological knowledge that is cherished by societies worldwide. It is an instrument for political, socio-economic scientific and technological developments (Githua & Mwangi, 2003). This does explain why mathematics is a compulsory subject for all learners in Primary and Secondary Schools in Nigeria NPE, 2010. It is also used by Universities to select Secondary School learners for entry into Science-based Degree Programmes (Joint Admissions and Matriculation Board, 2006). The depth of Mathematical knowledge an individual has dictates, the level of accuracy of his or her decision. This implies the fact that before an individual can function well in the society, one must possess relatively good knowledge of Mathematics especially in this era of Technological age. Kerlinge, (2003) describes Mathematics as a Language of Science. Aminu (2000) argues that Mathematics is not only the Language of Sciences, but essential nutrient for thought, logical reasoning and progress. Mathematics liberates the mind and also gives individuals an assessment of the intellectual abilities towards direction of improvement. The author concludes by saying that mathematics is the basis of all sciences and technology for all human endeavour's and that application of mathematics cuts across all areas of human knowledge (Aminu, 2005).

The National Policy on Education (2010) acknowledges the role of Mathematics in Scientific and Technological Development and recommends it as a compulsory subject in the secondary school curriculum. The syllabus is designed in such a way that the knowledge and skills acquired in one level become a prerequisite for the next level, for example, the law of Statistics is Arithmetic. (Oliweh, 2010; Uche, 2012) argued that Mathematics need not to be learned by

students in senior secondary for the sake of career choice or advancement but students should be able to learn Mathematics with understanding and to apply Mathematical ideas later in life. The intention of curriculum developers in Nigeria is to develop senior secondary school mathematics syllabus that will help students become numerate, accurate and precise in thought (NPE, 2010). This is in line with National Goals of Education in Nigeria, NPE, (2010). As much as this could be a noble desire of curriculum developers, a student may complete his/her senior secondary School education without necessarily being numerate, accurate and precise in thought. Macnab and Cummine, (2006) stated that learning of Mathematics is a continuous process and is not limited to the classroom experience only.

According to Okoh, (2007) in his study that gender related to the difference in sex (male or female) and how this quality affects their disposition and perception towards life and academic activities. Difference in gender as it affects students and academic performance is inconclusive. Buadi, (2000) added that this has necessitated the need to compare the difference between male and female students as reflected in their academic performance. He is of the view that the relationship would be of considerable help in developing a more effective and practical counseling techniques for students, teachers and parents in Nigeria with the ultimate goal of enhancing students academic performance. Jacobs, (2002) discovered that globally, most studies show that on the average, girls do better in school than boys. Girls get higher grades and complete high school at a higher rate compared to boys. National Centre for Education Statistics, (2003) reported that a standardized achievement tests also showed that females are better at spelling and perform better on tests of literacy, writing and general knowledge. An international aptitude test administered to fourth grade in 35 countries showed that females outscored males on reading literacy in every country.

The concept of students' academic performance has become a source of concern to researchers, especially as the academic performance of students is declining. Academic performance is regarded as student participant's examination grade at the end of a particular term or academic year. Egbule, (2004) says it could also be seen as the level of performance in a particular subject of study and that higher scores indicate better academic performance. Ugoji, (2008) opined that laudable values attached to academic performance have shown that students' performance is declining. Ukpona, (2007) found that this could be that they are confronted with so many school and non-school related demands and responsibilities. This problem seems to be a major one that requires urgent and serious solution since students' academic performance affects the quality of human resource within the society. The poor academic performance of students in recent times cut across all subject areas including the sciences. Female students' performances in the sciences are found to be lower than that of the males. With all the emphases given to Mathematics including making it a core subject in Secondary School Curriculum, students' performance in examination has been poor at Secondary School Certificate Examination (SSCE) conducted by NECO and WAEC.

Gender Differences in Mathematics Achievement in Secondary Schools

Mathematics achievement is the attainment, accomplishment or successful performance in a Mathematics examination, measured in scores that candidates obtain in an examination (Makau, 1997). Kenya's records show that girls continue to underachieve in mathematics national examinations. In the 1999 KCSE examination results, for instance, girls obtained a lower mathematics performance mean score of 10% compared to 14% for boys (Muthini, 2006; Mwaniki, 2000; Mureithi, 2000). Gender differences in Mathematics achievement begin to

appear at the upper Primary School level and increase in Secondary Schools (Githua, Mwangi/*International Journal of Educational Development*, 23 (2003). Makau, 1994; Obura, 1991). These differences are caused by an interaction of factors within and outside the school as well as by the students' background (Makau, 1987; Makau & Coombe, 1994). Students' efforts, ability and their teacher's effectiveness greatly influence their performance in Mathematics (Scott, 1997) but, unlike in developed countries where teaching resources are in abundance, in developing countries Mathematics performance is influenced more by current factors within a school (Farrel, 1993). Study done by Dénes Szűcs, (2012) in Britain has revealed that secondary school children experience mathematics anxiety. These results might suggest that girls may have had the potential to perform better than boys in Mathematics; however, their performance may have been attenuated by their higher levels of MA. Therefore, the study intended to find out the gender differences in Mathematics performance.

It is based on this gender differences that this study seeks to examine the gender differences in Mathematics performance on female students' achievements in science subjects in Secondary Schools of Delta State, Nigeria.

According to Oliweh, (2017) at the very beginning, the concept of gender occurred in the field of social science, gender difference and gender gap was being taken as an important issue in socioeconomic development and social wellbeing. Depending on the context, the discriminating characteristics vary from sex to social role to gender identity (Ajai & Imoko, 2015). Gender differences in Mathematics achievement and ability has remained a source of concern as scientists seek to address the under-representation of women at the highest levels of Mathematics, Physical Sciences and Engineering (Asante, 2010). From the beginning of research till today many researches has been done in gender difference and its impact in student's achievement in Mathematics. Gender differences in secondary Mathematics are a prominent issue that has been the focus of many studies, with reported differences in Mathematics achievement between boys and girls as contentious. The literature has not come to a clear consensus; some studies have shown girls outperforming boys (Stevens, Wang, Olivarez, & Hamman, 2007), while others find boys outperforming girls (Preckel, Goetz, Pekrun, & Kleine, 2012). Recent research from large-scale studies such as the Trends in International Mathematics and Science Study (TIMSS) has found that "there were no gender differences in 22 of the 42 countries that tested at Year 8, including Australia" (Thomson, Hillman, & Wernet, (2012, p. 20).

Purpose of the Study

To ascertain if there is any differences in the academic performance of male and female students in secondary school mathematics subjects.

Research Question

What is the difference in the academic performance between female and male students in mathematics subjects?

Research Hypothesis

There is no significant difference between the performance of male students and their female counter-part in mathematics subjects.

Methods

This study examines gender differences in students' performance in senior secondary schools mathematics. Correlational research design was used in which a random sample of 24 students was obtained in Delta state. An investigation of the difference between the Dependent variable (Academic Achievement) and Independent Variable (Gender, Female role model and Attitudes) and the magnitude of the differences that exist between them is determined through this design.

The population of the study is senior Secondary Students (SSS 3) offering Mathematics in Delta State with a population of 800 students.

Data collected was analyzed using the Statistical Package for the Social Science (SPSS) according to the research objectives of the study. The hypothesis was tested at 0.05 level of significant. Research hypothesis one was analyzed using t-test analysis for mean variance. The decision was based on the t-test p-value of the models.

Analysis of Research Question: What is the difference in the academic performance between female and male students in mathematics subjects?

Table 4.1: T-test Analysis on the Performance of male and female students' in Mathematics subjects

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	12	39.17	8.716	2.516
Female	12	38.67	9.700	2.802

Table 4.1 is a t-test table that compared the mean performance between male and female scores in science. The scores of 12 male and 12 female students were selected at random from the main result sheet and use for Leven test of the mean equality. The mean scores for male students are 39.17 while the mean scores of the female students are 38.67. The result indicates that there is no significant difference between the achievement of male and female students. Therefore, gender stereotyping does not have influence on male and female students' academic achievement in mathematics subjects.

Research Hypothesis 1: There is no significant difference between the performance of male students and their female counter-part in mathematics subjects.

Table 4.5: Summary of Independent Sample Test (Levene's Test for Equality Variance) on the Performance of male and female students' in Mathematics Subjects

Gender	F	Sig.	T	Df	Sig. (p-value)	Mean difference
Male	.158	.695	.133	22	.896	.500
Female			.133	21.74	.896	.500

From the Independence Sample Test in Table 4.5, the F-test (Levene's test) can be examined for Equality of Variance shown by the P-value against alpha (α)=0.05. The F-value (.158) which is significant at .695 and the P-value 0.896 is greater than the alpha value at 0.05 $P(22 \text{ N } 12) 0.896 > 0.05$, hence we Accept the Null Hypothesis that there is no significance difference in the academic performance of female and male students in mathematics subjects.

Discussions

The result of the t-test on students' academic achievement in mathematics subjects between male and female students shows that there is no significant difference in the performance of male and female students. Gender stereotyping is not a determining factor to female performance in mathematics subjects. This findings agreed with the findings of Arigbabu & Mji, (2004); Bilesanmi-Awoderu, (2002); Freedman, (2002); Sungur & Tekkaya, (2003) who asserted that there are no longer distinguishing difference in the cognitive, affected, and psychomotor skill achievements of students in respect to gender. Girls can be encouraged and sensitized into developing positive attitudes towards science. Similarly, the findings agree with the studies of Eccles, (2001) who confirmed that women should be just as represented in the technology or mathematics work force as men. However, the study negates the findings of Aguele & Uhumniah, (2008); Billings, (2000); Croxford, (2000); Kolawole, (2007) who found that male students performed better than female students in the cognitive affective and psychomotor skills achievements. There is a strong association better gender and response to science education.

Summary

The focus of this study was to determine the influence of gender differential mathematics achievement of students in selected senior secondary schools in Delta State, Nigeria. A review of the existing literature was conducted in order to develop understanding on the effects of Gender Differences on students' Performance in Mathematics.

The findings reviewed that "there is no significant relationship between the gender-related factors that influence the performance of boys and girls in Mathematics in Secondary Schools, Delta State".

Conclusion

In Conclusion, this study brought to light the influence of gender differential on student's Performance in science subjects in Secondary Schools in Delta State. The study revealed that there is no significant relationship between the Gender-related factors that influence the performance of Boys and Girls in Mathematics in Secondary Schools, Delta State.

This shows that achievement in Mathematics subjects is not based on gender. Also, there is significant difference between the academic performance of Boys and Girls in Mathematics. This implies that positive attitude from both the teachers and students will lead to higher performance in Mathematics while negative attitude will affect students' performance negatively in Mathematics.

Recommendations

Based on the findings of this study, the following recommendations are made:

- a) To improve the interest, participation and performance of female students' in Mathematics subjects, learners should be encouraged by the subject teachers, principals of various schools, educational bodies, parents and government in ensuring that the factors that influences and determine academic achievement of female students are positive enough to enhance teaching and learning in the school system.
- b) School curriculum developers should make a reform based on upon balanced consideration of all the important variables that relate to female students' academic achievement in the sciences.
- c) Parents need to guide their children irrespective of their gender to be inquisitive to science and to develop positive attitude towards science very early in life.

- d) Given the influence of parents' expectations for Science, Technology, Engineering and Mathematics (STEM) education and STEM careers on the future career aspirations among females, teachers should consider informing parents of female students about career opportunities in Science, Technology, Engineering and Mathematics (STEM) careers and what academic preparation is needed to be successful in these careers.
- e) Instructional professionals, including administrators, should examine gender bias that may be inherent in science classrooms including teacher's attitudes, behaviours, and pedagogical strategies to increase female students' participations in Mathematics Subjects.

References

- Adegboye, A.O & Adegboye, O.A (2003). An analysis into school students' performance in SSCE Mathematics. *Lafiagi Journal of Science Education* 5(1&2), 25-31.
- Afuekwe, A.I. (2002). History of Science in Nigeria. An Unpublished Doctor of Philosophy Term Paper.
- Aguele, L.I and Agwugah, N.V. (2007). Female Participation in Science, Technology and Mathematics (STEM) education in Nigeria and National Development. *Journal of Social Science*, (2), 127-126.
- Ajila, C and Olutola, A. (2007). Impact of Parent's Socio-Economic status on University students' Academic Performance. *Ife Journal of Educational Study*, 7 (1):34-39.
- Akanbi, A.O (2003). Trend in Physics Education in Schools in Kaduna condition. *Lafiagi Journal of Science Education*, 5(1&2),69-75.
- Bilesanmi-Awoderu, J.B. (2004). Computer-Assisted Instruction and Simulation/Games, and Lecture Methods as Determinants of Secondary School Students' Attitude towards Biology. *Educational Perspectives*, 7 (1), 1-11.
- Eccles, J.S. (2001). Achievement Inj. Worell (Ed.), *Encyclopedia of Women and Gender: Sex Similarities and Differences and the Impact of Society on Gender* (pp. 43-53). San Diego: Academic Press.
- Egbule, J.F. and Egbule, E.O. (2006). *Developmental psychology*. Benin City: Justice Jeco Pub. Ltd.
- Egbule J.F. (2004). *Practical guide to a successful project or this is writing and defence*. Owerri: White and White Publishers.
- Erinosho, Y.E. (2005). Women and Science. 36th Inaugural Lecture, Olabisi Onabanjo University, Ago-Iwoye, 1-37.
- Federal Republic of Nigeria (2004). National Policy on Education Lagos: NERDC Press.
- Freedman, M.P. (2002). The Influence of Laboratory Instruction on Science Achievement and Attitude Towards Science across Gender Differences. *Journal of Women and Minorities in Science and Engineering*, 8 (2), 50.
- Gharibyan, H. (2007). Gender Gap in Computer Science: Studying its Absence in One Former Soviet Republic. ASEE 2007 Proceedings: 2007 Annual Conference. Retrieved March 1, 2009.
- Hazari, A. Tai, R.H. & Sadler, P.M (2007). Gender Differences in Introductory University Physics Performance: The Influence of High School Physics Preparation and Affective Factors. *Science Education*.
- Kolawale, E.B (2007). Effects of competitive and co-operative learning strategies on academic performance of Nigerian students in mathematics educational research review, 3(1), 33-37.
- Okonkwo, E.N. (2010). Child, Family School, Society and Government as Predictors of a Child's Academic Performance of some Secondary School Students. *Contemporary Humanities*, 4 (1 and 2): 54-63.
- Onyezugbo, E.U. (2003). Effects of Gender, Age, and Education on Assertiveness in Nigerian Sample. *Psychology of Women Quarterly*, 27, 1-16.
- Otuka, J.O. (2004). "Foundations of Science Education." National Open University of Nigeria. "Role model". Dictionary.com. Random House, Inc. 2013. Retrieved 25 January 2014.

- Rubby, A. (2006). Improving science achievement at high-poverty urban middle school science education, 10, 1005-1027.
- Society of Women Engineers 2008. Women in Engineering. A review of Literature. Society of Women Engineers, Summer, 2008.
- Ugoji, F.N (2008). The impact of counseling on the academic performance of secondary school students. *African Journal for Inter-Disciplinary Studies*, 8 (2): 67-73.
- Ukueze, A.C (2007). Learner variable of academic performance and adjusting of junior secondary student. *The counselor*, 23 (2): 172-183.