THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Gender Differences in Mathematics Performance of Secondary School Students in Obio/Akpor Local Government of Rivers State, Nigeria

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Abstract:
The study investigated Gender Differences in Mathematics Performance of Secondary School Students in Obio/Akpor Local Government of Rivers State. The descriptive research design was used for the study. The population comprised all secondary school students in Obio/Akpor Local Government Area in Rivers State. A sample of 195 was selected with the simple random sampling technique. The instrument for data collection was a questionnaire titled Mathematics Achievement Test (MAT). Mean and standard deviation were used to answer the research questions while t-test statistic was used in testing the hypotheses at 0.05 level of significance. The result of the study shows that there was a difference in the performance of male and female students in mathematics. Also, there was a significant difference in the mathematics performances of male and female students in rural and urban secondary schools. The study recommended that students should devote more time for mathematics; especially female students to enable them meet up academically with their male counterparts; and parents in the rural areas should not occupy their wards with much domestic chores to enable them have more time for the study of mathematics.

Keywords: Mathematics, academic performance, gender differences

1. Introduction

Mathematics is a subject that has great contribution to the technological, educational and economic advancement of any society. The importance of mathematics to any facet of human life cannot be overemphasized. Without mathematics there will be no technology and without technology there will be no modern society. A strong background in mathematics is critical for a nation's development; knowledge of mathematics is indispensable to every human being. Mathematics helps in our daily activities as we relate with one another in school, business, religious and other social activities. Hardly do we engage in any venture without mathematics coming into play.

In the light of the above therefore mathematics is made compulsory for every learner at every level of education in Nigeria-Basic, secondary and tertiary. Virtually all the subjects offered have elements of mathematics which enhances understanding. The usefulness of mathematics is well captured by Tetteh, Wilmot and Ashong (2018:38) when they stated that:

> 'It is of optimum importance that sufficient knowledge in mathematics equips one to fit well into various scientific and technological fields in this modern world. It is therefore implacable for any person to live anywhere in this world without making use of mathematics of some kind, a testimony that mathematics is very useful in all that we do.
> In addition, mathematics is one single subject whose indispensable concepts, skills, generalization and applications permeate many fields of study; science, technology, economics, geography, commerce, engineering, medicine, business and management studies, in industry and several other fields of human endeavour'.

The Federal Republic of Nigeria FGN (2014) included mathematics as one of the core subjects in both the junior and senior secondary schools. This implies mathematics is compulsory for students to study and pass at credit level in order to be promoted to the next level in their academic pursuit; and those who fail are given the opportunity to repeat before proceeding to higher levels.

Mathematics gives an individual the most exciting and rewarding intellectual activities. In today's world, mathematics could be used as a means of predicting seasons, navigating ships, building homes and state, constructing reads, drawing maps, developing weapons, planning warfare, increase in trade and commerce, directing traffic, developing atomic energy, discovering numerals and space exploration, forecasting the weather, predicting population growth, preserving cultural heritage and increasing agricultural production (Kemka, 2020).

The trend in the academic achievement of secondary school students in Nigeria in the last two decades has become a major source of concern to stakeholders in education, and there is a mass decline in the achievement of students in internal and external examinations such as the National Examinations Council (NECO) and the West Africa Senior School

Certificate Examination (WASSCE). Mathematics being an important subject is not left out in this regard. Uwadiae cited in Onyiah (2015) reported that from 2005-2016, the percentage of students who obtained five credits including English and mathematics range from 15% to 31%. This is rather low for a country that wants to meet up with the fast technology and scientifically developing world. This poor performance has been attributed to many factors such as poor teaching, unpreparedness on the part of the students, poor learning environment, location of schools, inadequate instructional materials, evaluation process, and possibly gender differences in performance in mathematics and other related subjects in the sciences.

Over the years, there has been a persistent concern on gender roles in the homes, schools, work places, etc. The world is seen as male dominated and the Bible even referred to women as weaker vessels. In any activity involving both the man and woman, the women often evoke some measure of sympathy over the men. Gender differences in most human endeavour have therefore engaged the minds of many authorities and thinkers. While many have settled with the notion that it is a man's world and women are second fiddles. There are yet many who believe that all human beings are created equal and hence what a man can do a woman can do even better.

Gender differences manifest and influence our choice and preference in our daily life. It also influences our career, life and determine largely what we become eventually in life. In our schools, certain subjects are associated with boys or men while others are seen as the domain for girls or women. Subjects in sciences and mathematics are often seen as boys/men's domain, while subjects in arts, humanities, fashion, etc. are dominated by girls/women.

The issue of gender differences in mathematics has generated a lot of debates among researchers in education. There are differences in mathematics   performance among boys and girls as reported by some studies. For example, Johnson's and Mullis' study (as cited in Tetteh, Wilmot &Ashong, 2018) reported that male advantage in mathematics performance is a universal phenomenon, while early research (Fennema& Sherman as cited in Tetteh, Wilmot &Ashong, 2018) revealed that males out performed females in mathematics   achievement at junior high and senior high school levels. Further Gallagher and Kanjonan (2005) agreed that the achievement and interest of boys are higher than the girls. However, Robin and Lubiensk, as cited in Samuelsson and Samuelsson (2016), reported that girls have better grades in mathematics over the last four decades than boys. Also, Brown and Kanyongo (2010) investigated gender differences in performance on mathematics component of 3 National Assessment in Trinidad and Tobago, and they reported whereas girls performed better than boys on all categories and all skill areas on the test, the effect sizes were small. In the same vein, Branner, Krauss and Kunter cited in Brown and Karyongo (2010) investigated 'the performance on mathematics items of students in Germany'. In their study they compared gender differences in overall mathematics ability, and specific mathematics ability. They found that girls slightly outperformed boys on reasoning ability, but on specific ability, boys had a significant advantage over girls'.

In Nigeria, gender achievement studies include a study by Ayoola, Oladosu and Adeniji (2015) who investigated gender difference in solving mathematics real life problems among junior secondary school students in Osun State. The study adopted descriptive design of survey type. The result of the study showed that there was significant difference in the mathematical real-life problem-solving approaches of male and female students. They recommended that male and female teachers should jointly with boys and girls adapt a more socially and inclusive approach to creating equal opportunities for all students. Dumnamene and Chikwe (2018) carried out a study on comparative study of gender differences in the academic achievement of students in selected private and public secondary schools in Rivers State in English language and mathematics. The findings of the study revealed that there was no significant different in academic performance of males and females in English language. However, there was significant difference in the academic performance of males and females in mathematics in private and public schools.

Researchers have reported that attitude of students towards mathematics affects the abilities of male and female in the discipline (Tocci & Engelhard, 1991). However, Orhun (2007) revealed that male students are more self-confident about their mathematical abilities than females. The existence of these differences in mathematics performance will have implication for the teaching and learning of mathematics in areas of instructional strategies, learning environment, and instructional materials appropriate for male and female students in the learning of mathematics. Most of the studies reviewed made use of the West African Examination Council (WAEC) results. This study used the mathematics achievement test constructed by the researcher. The aim of this study was to investigate whether there is difference in mathematics performance among male and female students.

1.1. Statement of the Problem

Mathematics is a subject that has relevance not only to students but also to everybody who wants to make progress in life. There has been persistent decline in the performance of students in mathematics, and this is raising a lot of concerns among educators and well-meaning individuals in society. At the root of technological advancement in the world today is the application of mathematical knowledge acquired through learning. A subject of this nature needs to be mastered by all students-male and female. But researches have shown gender inequality in mathematics performance at all levels of the educational system especially in the study area. The problem of this study therefore is to find out whether there is difference in the mathematics performance among male and female students.

1.2. Research Questions

The following research questions guided the study:

- What is the difference in the mathematics performance of secondary school students in Obio/Akpor Local Government Area based on gender?

- What is the difference in the mathematics performance of male and female secondary school students in Obio/Akpor Local Government Area based on school location?

1.3. Hypotheses
1. There is no significant difference in the mathematics performance of secondary school students in Obio/Akpor Local Government Area based on gender.
2. There is no significant difference in the mathematics performance of male and female secondary school students in Obio/Akpor Local Government Area based on school location.

2. Methodology

The study employed the descriptive research design; the design was used to find out the nature of difference that exists among male and female students in their mathematics performance. The population of the study comprised all secondary school students in Obio/Akpor local government area of Rivers State. The sample comprised 195 students selected with the simple random sampling technique. The instrument for data collection is titled Mathematics Achievement Test (MAT). The test re-test method was used to obtain the reliability of the MAT and it yielded reliability coefficient of 0.85. Mean and standard deviation were used to answer the research questions while t-test statistic was used in testing the hypotheses at 0.05 level of significance.

3. Results

3.1. Research Question One
What is the difference in the mathematics performance of secondary school students in Obio/Akpor Local Government Area based on gender?

Gender	N	Mean ($\bar{x}$)	SD
Male	101	67.6	4.6
Female	94	51.2	6.3

Table 1: Mean and Standard Deviation of Male and Female Students' Mathematics Performance

Table 1 show that the mean score and standard deviation of male students are 67.6 and 4.6 respectively. Also, the mean score and standard deviation of female students are 51.2 and 6.3 respectively. A closer look at the table reveals that there is difference in the mathematics performance of male and female students in the in secondary school in Obio/Akpor Local Government Area. The difference is that the male students scored higher or better than the female students by 16.4 in their mean scores.

3.2. Research Question Two
What is the difference in the mathematics performance of male and female secondary school students in Obio/Akpor Local Government Area based on school location?

Gender	N	Mean ($\bar{x}$)	SD
Male	60	54.5	5.6
Female	48	50.8	4.1

Table 2: Mean and Standard Deviation of Male and Female Students' Mathematics Performance in Rural Schools

Table 2 shows that mean score and standard deviation of male students are 64.5 and 5.6 respectively. Also, the mean score and standard deviation of female students are 50.8 and 4.1 respectively. The table further revealed that there is difference in the mathematics performance of male and female students in JSCCE in rural schools. The difference is that the male students score higher or better than the female students by 13.7 in their mean scores.

Gender	N	Mean ($\bar{x}$)	SD
Male	46	70.6	3.6
Female	41	55.9	4.2

Table 3: Mean and Standard Deviation of Male and Female Students' Mathematics Performance in JSSCE In Urban Schools

Table 3 shows that mean score and standard deviation of male students are 70.6 and 3.6 respectively. Also, the mean and standard deviation of female students are 55.9 and 4.2 respectively. The table further shows that there is a difference in the mathematics performance of male and female students in JSCCE in urban schools. The difference is that the male students scored higher or better than their female counterparts by 14.7 in their mean scores.

3.2.1. Hypothesis One
There is no significant difference in the mathematics performance of secondary school students in Obio/Akpor Local Government Area based on gender.

Gender	N	Mean ($\bar{x}$)	SD	Tcal	Sign. level	P-value	Decision
Male students	101	67.6	4.6				
Female students	94	51.2	6.3	20.9	0.05	0.0001	Rejected

*Table 4: T-Test Analysis of Significance Difference between Male and
Female Students in Their Mathematics Performance*

Table 4 shows that the calculated t-value is 20.9, level of significance, 0.05 and the p-value of 0.0001. Since the p-value is less than the level of significance, the null one hypothesis is rejected. This implies that there is significant difference between male and female students in their mathematics performance.

3.2.2. Hypothesis Two
There is no significant difference in the mathematics performance of male and female secondary school students in Obio/Akpor Local Government Area based on school location.

Gender	N	Mean ($\bar{x}$)	SD	Tcal	Sign. level	P-value	Decision
Male students	60	64.5	5.6				
Female students	48	50.8	4.1	14.2	0.05	0.0001	Rejected

*Table 5: T-Test Analysis of Significant Difference between Male and Female Students in Their Mathematics
Performance in Rural Schools*

Table 5 shows that the calculated t-value is 14.2, significance level, 0.05 and the p-value of 0.0001. Since the p-value is less than the level of significance, the null hypothesis is rejected. This means that the difference in the mathematics performance of male and female students in rural schools in significant.

Gender	N	Mean ($\bar{x}$)	SD	Tcal	Sign. level	P-value	Decision
Male students	46	70.6	3.6				
Female students	41	55.9	4.2	17.6	0.05	0.0001	Rejected

*Table 6: T-Test Analysis of Significant Difference between Male and Female
Students in Mathematics Performance In Urban Schools*

Table 6 shows that the calculated t-value is 17.2, significant level, 0.05 and the p-value of 0.0001. Since the p-value is less than the significance level, the null hypothesis is rejected. This reveals that there is significant difference between the mathematics performance of male and female students in urban schools.

4. Discussion
The result of research question one shows that there is difference between male and female students in mathematics performance in secondary schools in Obio/Akpor Local Government Area of Rivers State. Male students performed better than their female counterparts. Also, the test of significant difference shows that the difference in the performance of male and female students in mathematics is significant. This finding is in agreement with Mullis as cited in Tetteh, Wilmot and Ashong (2018). Also, Gallagher and Kanfman (2006) study aligned with this finding.
The result of research question two revealed that there was difference in the mathematics performance of male and female students in secondary schools in rural and urban areas. The statistical test of significance using t-test statistic showed that the differences were significant. In the rural and urban schools, male students outperformed the female students. This result is in agreement with previous findings of Dumnamene and Chikwe (2018), Orhun (2007) who reported significant differences is the performance of male and female students in mathematics.

5. Conclusion
The study has revealed the existence of gender differences in the academic performance in mathematics among secondary school students in Obio/Akpor Local Government Area of Rivers State; male students had higher performance than the female students. The gender differences in mathematics performance were significant among students in urban and rural schools.

6. Recommendations
Based on the result of the study, the following recommendations are made: -
- Students should devote more time for mathematics; especially female students to enable them meet up academically with their male counterparts.
- Parents especially those in the rural areas should not occupy their wards with much domestic chores to enable them have more time for the study of mathematics.
- More time should be allocated to the teaching of mathematics on school time tables so that mathematics syllabus can be completed on time.
- The government should sensitize the local communities to discard beliefs and practices that prohibit effective participation which result to poor performance and gender difference of students in mathematics.

7. References

i. Aholu, B.A. (2020). *Relationship between continuous assessment and secondary school certificate examination scores in mathematics in Bonny Local Government Area of Rivers State*. Unpublished Master's Thesis. Ignatius Ajuru University of Education, Rivers State.

ii. Ayoola, R.D., Oladusi, C.T. &Adeniji, A.A. (2015). Gender influence on solving mathematics real life problems among junior secondary school students in Osun state. *Journal of Evaluation,* 1(1); 20-34.

iii. Brown, L.I. &Kanyongo, G. Y. (2010). Gender differences in mathematics performance in Trinidad and Tobago: Examining affective factors. *International Electronic Journal of mathematics education,* 5(3): 113-130.

iv. Dumnamene, F.G. &Chikwe, C.K. (2018). Comparative study of gender differences in the academic achievement of students in selected private and public secondary schools in River's state. *International Journal of Psychology and Counselling,* 9-16(1); 15-30.

v. Federal Government of Nigeria, FGN (2014). *National Policy on Education* (6thed). Abuja: Nigerian Educational Research & Development Council (NERDC).

vi. Gallagher, A.M. &Kanfman, J.C. (2005). *Gender differences in mathematics: An integrative psychological approach, C*ambridge: Cambridge University.

vii. Onyiah, M.E. (2015). *Gender difference and academic performance of students in mathematics in West Africa Senior Secondary School Certificate Examination in Eleme Local Government Area of Rivers State*. Unpublished Post-Graduate Diploma in Education Project. National Teachers Institute, Kaduna.

viii. Samuelsson, M. & Samuelsson, J. (2006). Gender differences in boys' and girls' perception of teaching and learning mathematics. *Open Review Educational Research*, 3(1); 18-34. https://doi.org/10.1080/23265507.2015)

ix. Tetteh, H.N.K.; Wilmot, E.M. &Ashong, D. (2018). Gender differences in performance in mathematics among pre-service teacher in Ahafo Region of Ghana. *International Journal of Education, Learning and Development,* 6(5): 38-45.