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The Influence of Gender, School Location and Socio-Economic Status on Students' Academic Achievement in mathematics

Caroline Ochuko Alordiah[1]* Grace Akpadaka[2] Christy Oritseweyimi Oviogbodu[1]
1.Department of Educational Psychology, College of Education Warri, Delta State, Nigeria
2.Department of Educational Foundations and Administration, College of Education Warri, Delta State, Nigeria

Abstract
The study investigated the influence of gender, school location, and socio-economic status (SES) on students' academic achievement in mathematics. The study was an ex-post factor design in which the variables were not manipulated nor controlled. Four research questions and three hypotheses were formulated to guide the study. The stratified random sampling approach was used to sample 1900 students such that the variables in the study were put into consideration. Two instruments were used for this study namely mathematics objective test (MOT) and socio-economic status questionnaire (SESQ). Experts in mathematics and measurement validated the instruments. The reliability of the MOT and SESQ using the test-retest method of establishing reliability yielded 0.71 and 0.70 respectively. The results of the study showed that students have an average achievement in mathematics. The result also showed that male students performed better than female students, urban students performed better than rural students and students of parents with high SES performed better than students of parents with low SES. One of the recommendations was that teachers should put into consideration the disparities that exist between male/female, urban/rural, and low SES/high SES when teaching mathematics.
Keywords: Academic achievement, Gender, School location, and Socio-economic status.

1. Introduction

Many Nigerian students are performing below expectation in their academics. The tread in the academic achievement of secondary school students in Nigeria in the last two decades has become a major source of concern to all stakeholders in the educational sector (Nwadinigu and Azaka-Obieke, 2012). There is a mass decline in the achievement of students in both National Examination Council (NECO) and the West Africa Senior Secondary Certificate Examination (WASSCE) (Dawa, Adamu and Olayomi, 2005). Adesemowo (2005) further stressed the issue by explaining that the annual release of senior secondary certificate examination (SSCE) conducted by West Africa Examination Council (WAEC) depicts the problematic nature and generalization of poor secondary school students' achievement in different school subjects especially mathematics and English language among secondary school students. The stakeholders in education agree that the huge investment on education is not yielding the desired dividend.

According to Nwadinigu and Azuka-Obieke, 2012, poor academic achievement is an achievement that is adjudged by the examiners as falling below an expected standard. It is when a student performance is below his actual ability. It could be as a result of several factors such as poor teaching, psychological factors, unpreparedness on the part of the students, poor learning environment, location of schools and the evaluation process.

Mathematics been the chief corner stone in the sciences is not left out in this issue. The results of WAEC from 2001 to 2005 in mathematics indicated that a high proportion of students recorded failure grade F9 and low pass grade of P7 and P8. Also from 2005 – 2011 the percentage of students who obtained five credit including English and mathematics ranges between 15% to 31% (Uwadiae, 2008 & All African. Com, 2012). Igbokwe (2003) stressed that without mathematics there will be no technology and without technology there will be no modern society. This implies that a strong background in mathematics is critical for the nation's development. It is not surprising therefore the interest of WAEC, mathematics teachers, educationist, parents and government in finding solutions to the problems that militate against the teaching and learning of mathematics in secondary schools.

Several factors such as attitude of students and teachers, study habit, teachers' qualification, teaching methods, school environment, government policy, school location, family types have been identified in several studies as factors influencing students' academic achievement (Edwards, 2000; Aremu & Sokan, 2003; Asikhia, 2010; Akomolufe & Olorumfemi-Olabisi, 2011).

Arigbabu and Mji (2004) are of the opinion that in Nigeria, and perhaps the whole of Africa, gender bias is still very prevalent. Abdullahi, Kalejaiye-Matti, Garba and Balogun (2007) agreed that socialization patterns in Nigeria and most African setting, place enormous restrictions on the female gender and from her a higher input of daily domestic labour than from the male. This perception automatically scheme female out from any consideration for serious professional discipline even in cases where the female appears to be more brilliant than their male counterpart is. Raimi and Adeoye (2006) observed in their research on gender differences among college students in integrated science, that there is a significant difference between males and females in their

attitude towards integrated science. Oludipe (2012) and Kola and Taiwo (2013) observed in there various studies that there is no significant difference between male and female performance.

Students attending rural schools face challenges of higher poverty than those attending urban schools. In Nigeria, the lingual Franca is English language, which in most cases is not widely spoken in rural schools. What obtains in most cases is the native language of that setting. This can greatly affect students' performance in mathematics since it is with English language mathematics is been taught and assessed in schools. Urban schools have main advantages like availability of resources, library, opportunities, good environment, teachers etc. However, one of the greatest advantages of rural schools is the tendency for smaller classes, which promise increased student evaluation, and provide greater flexibility in teaching strategy. However, Owoeye (2002) found that urban students performed better than rural students in all forms of achievement test used. Kissau (2006) reported that students in urban and rural location performed in a similar manner. Obioma (1989) indicated that most mathematically deficient learners were found in major urban centres rather than other locations. Igboegwu and Okonkwo (2012) study indicates a significant difference in students achievement with respect to location of school and education zones. The study showed that urban schools achieved significantly better than students in the rural schools did.

Socio-economic status (SES) is the way people are divided into groups in a society such that they have certain economic or/and social characteristics in common. Hart (2014) say that socio-economic status refers to the level of education, income, and professionalism of an individual or group. He further said that students with a lower SES often face additional challenges including unavailability of learning resources, difficult learning conditions, and poor motivation that negatively affect their academic performance. Many families in Nigeria are poor; they often struggle with providing academic support for their children. This could affect the academic achievement of students from such home. Okofor (2007) argued that while poverty and students low SES background could be considered a concern regarding students' academic performance, but the strongly determined and motivated students are likely to beat the odds of greater risk of academic failure and perform with distinction in school. Studies have reported that SES affects students' academic achievement (Udida, Ukwayi and Ogodo, 2012; Barry, 2005; and Eamon, 2005). Likewise, studies have also found that SES does not significantly influence students' academic performance (Ogunshola and Adewale, 2012; and Abosede, 2008).

Based on previous studies, the influence of gender, location and socio-economic status have not been stabled on students' academic achievement, this calls for continuous verification of the influence of gender, location and socio-economic status on students' academic achievement in mathematics from place to place and from time to time. Hence, there is need to finding out the influence of gender school location, and parents SES on students' academic achievement.

1.1. Statement of the Problem

Gender, location, and socio-economic status have been identified as some of the factors that can influence students' academic achievement in mathematics. Previous studies on the influence of these variables on academic achievement are not conclusive. While some of the findings of the studies discovered that, there is a significant influence of these variables on students' academic achievement. Some studies equally discovered that these variables do not significantly influence students' academic achievement. There is need to actually find out the influence of gender, school location and parents SES on students' academic achievement in mathematics. The statement of the problem of this study is put in question form as, what is the influence of gender, school location, and parents' socio-economic status on students' academic achievement in mathematics.

1.2. Purpose of the study

The main purpose of the study is to find out the influence of gender, location, and SES on students' academic achievement in mathematics. The specific purposes are to:

1. Find out the academic achievement of students in mathematics.
2. Assess the difference in students' academic achievement in mathematics with respect to gender.
3. Determine the difference in students' academic achievement in mathematics with respect to school location.
4. Determine the difference in students' academic achievement in mathematics with respect to parents SES.

1.3. Research Questions

1. What is the academic achievement of students' in mathematics?
2. Is there any difference in students' academic achievement in mathematics with respect to their gender?
3. Is there any difference in students' academic achievement in mathematics with respect to school location?
4. Is there any difference in students' academic achievement in mathematics with respect to parents'

socio-economic status?

1.4. Research Hypotheses

1. There is no significant difference in the academic achievement of students' in mathematics with respect to gender.
2. There is no significant difference in the academic achievement of students in mathematics with respect to school location.
3. There is no significant difference in the academic achievement of students in mathematics with respect to their parents SES.

1.5. Significance of the Study

The study will provide insights to the curriculum developers, teachers, parents, students, counsellors, and policy makers regarding the influence that gender, school location, and socio-economic status of parents can have on students' academic achievement in mathematics. The findings of the study will necessitate the stakeholders to advice on what best can be done so that these factors can help to improve student's achievement in mathematics. The findings of the study will add to empirical data bank on the influence of gender, school location, and parents SES on students' academic achievement in mathematics.

1.6. Scope/Delimitation of the Study

The study covers the influence of gender, school location, and parents' SES on students' academic achievement in mathematics. It was delimited to gender, location of schools and parents' SES. The study focus on senior secondary three (SSIII) students in Delta and Edo state in Nigeria.

2.0. Research Design

The study was an ex-post factor design in which the variables were not manipulated nor controlled. It focused on gender, school location, parents' SES and the academic achievement of students' in mathematics. The dependent variable was students' academic achievement in mathematics. The independent variables were gender, school location, and socio-economic status.

2.1.Population and Sample

The population of the study included senior secondary three (SSIII) students' from Delta and Edo states. According to the statistics from Delta and Edo states ministries of Education, there are 723 secondary schools in the two states with a population of 65,961 SSIII students.

Table 1: Sample of students used in the study.

Variable		No. of Students	% Percentage
Gender	Male	1008	53.1
	Female	892	46.9
	Total	1900	100
School location	Urban	1144	60.2
	Rural	756	39.8
	Total	1900	100

The stratified random sampling approach was used to sample out 1900 students such that the variables in the study were put into consideration. This is shown in table 1 above.

2.2. Instrumentation

Two instruments were used for this study namely mathematics objective test (MOT) and socio-economic status questionnaire (SESQ). The MOT was prepared by the researchers from a pool of past West African Examination Council (WAEC) mathematics objective test. The instrument contains 50 items that are dichotomously scored (i.e. 1 for correct answer or 0 for wrong answer). The SESQ has 20 items on a 3-point scale, most favourable (3), favourable (2) and least favourable (1).

2.2.1. Validation and Reliability of the Instruments

The two instruments were validated by mathematics teachers and measurement and evaluation experts, from their comments and recommendations, some of the items were modified and re-worded. A table of specifications and mathematics scheme of work for senior secondary schools in Nigeria were used to construct the MOT items. Content validity for SESQ was established by making sure that the instrument contains items that measure the yardstick (such as family's income, parent's educational level, parent's occupation and social status etc.) for classification of individual into high and low socio-economic status. Using the test-retest method of establishing reliability the MOT and SESQ yielded 0.71 and 0.70 respectively.

In addition, item analysis was done for MOT using item response theory-Rasch model. The MOT was

found to fit the Rasch model which showed that the unidimensionality (i.e. each item is measuring not more than one mathematical trait) assumption of the mathematics construct was met and the scores demonstrated little variation from model expectation. Hence, the MOT was valid and compatible with the Rasch model. Under the Rasch model, discrimination parameter is fixed at a value of a=1.0. The difficulty indices were found to range from -1.36 to 1.74, which falls within the recommended range, and it suggested that MOT covers a wide spectrum of ability of senior secondary school students. The standard error measurement (SEM) of the item mean is 0.09. This means that 9% of the total variance associated with MOT is attributed to error variance while 91% is attributed to true variance. Also the estimated latent trait ability of the examinees ranged from -4.06 to 2.93, which produced a substantially linear section in the region of -4.0 to 4.0. The standard error measurement (SEM) of examinees mean was 0.04, which indicated that 4% of the total variance associated with examinees ability is attributed to error variance while 96% is attributed to true variance. Therefore, both the MOT items and the ability estimate had a good precision of measurement.

2.3. Data Collection and Analysis

The researcher with the aids of assistance administered the instruments to SSIII students in Delta and Edo states. About 2000 copies of the MOT and SESQ were administered but only 1900 were returned back. The returned rate was about 95%. The maximum score of the SESQ is 60 while the minimum scores is 20 if all items are respondent to. For the purpose of this study the students with 40 and below was grouped as low SES while those with 41 and above was grouped as high SES. The maximum score of the MOT is 50 if all items were gotten right by the students. A score of 25 and above was regarded as being above average. The descriptive statistics of mean and standard deviation (SD) was used to answer the research questions while the Z-test was used to test the hypotheses at 0.05 level of significant.

3.1. Result

3.1.1. Research Question one

What is the academic achievement of students in mathematics?

Table 2: Descriptive statistics of students' Academic Achievement in Mathematics

No. of students	Minimum score	Maximum score	Mean	SD
1900	3	50	26.04	9.37

The data in table 2 showed the mean score performance of the students in mathematics as 26.04 with a standard deviation of 9.37. This is above the benchmark of 25. Hence, the mean score is above average. The minimum score the students got in the MOT was 3 while the maximum score was 50.

3.1.2.Research Question Two

Is there any difference in the students' academic achievement in mathematics with respect to gender?

Table 3: Z-test on differences in academic achievement with respect to Gender

Gender	N	Mean	SD	df	Z	Sig.	Decision
Male	1008	27.11	10.17				
				1898	5.39	.000	Reject H_o
Female	892	24.84	8.20				

The data in table 3 showed that the mean score of male students is 27.11 (SD=10.17), while that of female students is 24.84 (SD=8.20). The mean performance of male students is above the benchmark of 25 while that of female students is below the benchmark of 25. The mean score of male students is above average while that of female students is below average. Hence, the male students performed better than the female students in the MOT.

3.1.3.Hypotesis One

There is no significant difference in the academic achievement of students in mathematics with respect to their gender.

As shown in table 3, the computed Z-value of 5.39 was found significant at p=0.000 at df=1898 is equally significant at 0.05 since p<0.05. The hypothesis is rejected. In other words, there is a significant difference in the academic achievement of students in mathematics with respect to gender. Therefore, the mean difference, which is in favour of male, is significant. It indicated that the male students performed better than the female students.

3.1.4.Reseach Question Three

Is there any difference between the students' academic achievement in mathematics with respect to school location?

Table 4: Z-test on differences in academic achievement with respect to School location.

Location	N	Mean	SD	df	Z	Sig.	Decision
Urban	1144	29.09	10.22				
				1898	19.05	.000	Reject H_o
Rural	756	21.43	5.21				

The data in table 4 showed that the mean score of students in urban schools is 29.09 (SD=10.22), while that of students in rural schools is 21.43 (SD=5.21). The mean score of students in urban schools is above the benchmark of 25 while that of students in rural schools is below the benchmark. The mean score of students in urban schools is above average while that of students in rural schools is below average. Hence, the students from urban schools performed better than students in rural schools.

3.1.5. Hypothesis Two

There is no significant difference in the academic achievement of students' in mathematics with respect to school location.

As shown in table 4, the computed Z-value of 19.05 (df=1898) is significant at p=0.000 which is equally significant at 0.05 since p<0.05. The hypothesis is rejected. In other words, there is a significant difference in the academic achievement of students in mathematics with respect to school location. Therefore, the mean difference that is in favour of students in urban is significant and it indicated that the students in urban schools did better than their counterpart in rural schools.

3.1.6. Research Question Four

Is there any difference between the students' academic achievement in mathematics with respect to parents' SES?

Table 5: Z-test on differences in academic achievement with respect to Parents' SES.

SES	N	Mean	SD	df	Z	Sig.	Decision
High	865	28.06	10.49				
				1898	8.73	.000	Reject H_o
Low	1035	24.36	7.94				

The data in table 5 showed that the mean score of students from high SES parents is 28.06 (SD=10.49), while that of students from low SES parents is 24.36 (SD=7.94). The mean score of students from high SES parents is above the benchmark of 25, while that of students from low SES parents is below the benchmark. Hence, the students from high SES parents performed better than students from low SES parents.

3.1.7.Hypothesis Three

There is no significant difference in the academic achievement of students in mathematics with respect to parents' SES.

As shown in table 5, the computed Z-value of 8.73 (df=1898) is significant at p=0.000 which is equally significant at 0.05 since p<.05. In other words, there is a significant difference in the academic achievement of students in mathematics with respect to parents SES. Therefore, the mean difference that is in favour of students from high SES parents is significant and it indicated that the students from high SES parents did better than their counterpart from low SES parents.

3.2. Discussion of Results

The result of the study indicates that the students have an average achievement in mathematics. The result also showed that male students performed better than female students did significantly. This is in line with the findings of Onuekwusi and Ogomaka (2013), Amoo (2013), and Osuji (2000) but disagreed with the findings of Kola and Taiwo (2013) who observed that there is no significant difference between male and female performance.

Findings from the study showed that there is significant difference between the performance of urban students and rural students. The urban students performed better than the rural students did. This result agrees with that of Amoo (2013), Onuekwusi and Ogomaka (2013), Igboegwu and Okonkwo (2010), and Owoeye (2002) but negate that of Kissau (2006) and Obioma (1989). The urban students may have performed better than the rural students as a result of teachers not wanting to go to rural schools to teach, students spend so much time on farm work at the expense of the time they should spend on their study. On major market days most of the students would prefer to go to the market to sell their products or their parents product rather than going to school. In addition, the urban schools are constantly supervised by ministry officials as against the rural schools. This implies that students from rural schools who may have the same ability with students from urban schools are limited by some factors that prevent them from being their best in their academic.

The findings also, showed that students of parents with high SES did better than students of parents with low SES. This finding is in line with that of Udida, Ukwayi, and Ogodo (2012), Eamon (2005), and Barry (2005) but it is not in agreement with that of Ogunshola and Adewale (2012) and Abosede (2008). This finding was adequately supported by Alade, Nwadingwe and Victor (2014) when they asserted that SES of parents

affects the following areas of the child's school education: early attendance at school, provision of books and other materials, encouragement in school education, development of interest in school activities, academic and job aspirations. In addition, the students from high SES parents may have done better because of the resources, time, and money at their disposal.

4.0. Conclusion

Mathematics is a tool that can be used to bring about the desired transformation needed in Nigeria economy sector. If there are, factors that negatively affect the performance of some students in mathematics, there is need to address them as early as possible.

5.0. Recommendation

1. Teachers should put into consideration the disparity that exist between male/female, urban/rural and low SES/high SES when teaching mathematics.
2. Female students should be encouraged to show more interest in mathematics.
3. Government should provide incentives that will attract teachers to the rural area.
4. Equal supervisory activities by ministry official should get to all schools irrespective of location.
5. The distribution of the nation's resources should be done in a way to bridge the gap between low SES and high SES individuals.

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