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Effects of Gender and School Location on Students' Performance and Attitude towards Mathematics in Ekiti State, Nigeria

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Abstract

The study examined the effects gender and school location on students' performance and attitude towards Mathematics. The study adopted a descriptive research design of the ex-post facto. The population for the study consisted of all the Senior Secondary School Two (SSS II) students numbering 12,585 from 205 public secondary schools in the sixteen Local Government Areas (LGAs) of Ekiti State. The sample for the study consisted of 200 SSS I1 students randomly selected from two rural and urban areas. Two research instruments were used for this study. The instruments are; Students' Attitudinal Scale (SAS) and Mathematics Studies Performance Scores (MSPS). Two research hypotheses were formulated for this study. The data collated from the SAS and MSPS were used for the analysis. Inferential statistics of ANCOVA was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that gender and school location had no effects on students' performance and attitude towards Mathematics in Ekiti State, Nigeria. Based on the findings of the study, it was recommended that: there should be continuous promotion of gender equality among the students by the teachers, school management and the state government, more schools should be located in a well conducive learning environment to enhance students' performance and attitude towards Mathematics and the use of learners centred and more activities based strategies in the teaching of Mathematics should be encouraged in schools so as to improve the performance and attitude of students towards Mathematics.

Keywords: Gender, School Location, Performance and Attitude

Introduction

Mathematics is a core subject from primary school to post-primary school levels in the Nigerian educational system. According to Popoola and Akinwamide (2013), Mathematics is an essential tool needed to be able to function effectively in the present technological age. Mathematics is recognized by many as the bedrock of several subjects in the school curriculum, and it is indispensable to the national goal and objectives. Mathematics is a discipline that helps individual learners to develop logical reasoning ability that can make them to be self-reliant; it enables creativity, and creativity grooms self-reliance, industrial and technological development which helps in the realization of the National Policy on Education. The knowledge acquired from it can help the individual

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develop a positive approach to life situations in their daily interaction with society (National Policy on Education, FRN, 2013). Mathematics is applicable to a wide range of fields such as sciences, engineering, technology, social science, arts, among others.

This vital position occupied by the subject in the school curricula comes from the role of Mathematics in scientific and technological development. Mathematics is the foundation of science and technology, which is the essential requirement for the development of a nation (Oginni, 2013). Mathematics is the language of science that allows scientists to communicate ideas using universally accepted terminologies. Mathematics is the science of structure, order, numbers, space and quantity. It is also a relationship that revolves around the elementary practice of counting, measuring and description of shapes and objects.

Despite the uniqueness, innumerable importance and usefulness of Mathematics to national development, the students' performance and attitude towards the subject are not encouraging. Observation showed that mass failure characterized the performance of students in both internal and external examinations in the country. The problem is a global one which is evident in the research carried out by Karp (2016) on American students on 'Mathematics achievement' and the effort made to proffer solutions.

Previous records of the results of Mathematics from the West African Senior School Certificate Examinations (WASSCE) and the National Examinations Council (NECO) in Nigeria dailies clearly revealed the performance of students in this core subject. The researcher observed the dwindling situation of students' performance in Mathematics. The performance of students in Mathematics as evidenced in the results of WAEC in the years 2015 to 2019 in Ekiti State is observed to be unstable. This fluctuation in the performance of students in Mathematics has become an issue of great concern to stakeholders in the educational sector in recent times.

However, a lot of reasons have been proffered for this downward trend. These include: negative attitudes of students towards Mathematics, unproductive teaching strategies, inadequate and ineffective use of instructional materials, insufficient time, school location, the influence of gender, very few qualified Mathematics teachers, lack of effective teaching due to poor facilities, equipment and instructional materials, use of traditional chalk and talk methods, large pupils to teacher ratio and Mathematics phobia among others (Chinwoeke, 2014). Several instructional strategies have been employed to find out the cause of students poor performance in Mathematics and recommendations made but it seems the problem still persist. There is, therefore, the need to investigate this problem from other perspectives.

Hence, the need to investigate the effects of gender and school location on students' performance and attitude towards Mathematics in Ekiti State, Nigeria.

Literature

Gender is a socio-cultural construct of ascribing characters and roles to sex such as male and female (Emmanuel, Benjamin & John, 2010).Several studies have been conducted to determine the influence of gender on students' performance in Mathematics. Popoola (2010) in her study, reported that there are gender differences in attitude towards Mathematics with female students showing more negative attitudes than male students.Some researchers have found that male students performed better than female students in Mathematics (Shelly, 2016 and Shidu 2015). Also, some researchers have argued that female

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students receive more attention from teachers and that female students performed better at geometry, computation and spatial visualisation than male students (Ominrin, 2009). However, other studies do not support this theory. Based on several studies, some researchers have argued that there is no disparity in the performance of male and female students in Mathematics (Emmanuel, Benjamin & John 2010; Adegun&Adegun, 2013; and Ato& Adelaide, 2015). Uduosoro (2011) found that a significant difference existed between students' performance on difficult topics in Mathematics by male and female students.

Studies have shown that gender influences students' performance in Mathematics. Sidhu (2015) observed significant difference in the mean academic achievement scores of male and female students exposed to control and experimental groups. Results of findings on gender and students' achievement in Mathematics revealed that boys perform better in Mathematics than girls. Also, some researches expressed that teachers do not give equal attention to boys and girls. Most of the times, the boys are called upon to answer questions, especially in Mathematics, while the girls are referred to as "notable". Girls are not encouraged to express themselves freely, which could enhance critical thinking and facilitate confidence. This makes the girls look inferior, dejected and non -challant to classwork. It is generally believed that majority of girls dislike science subjects and consequently they do not perform creditably well in the subject whereas boys tend to have a natural inclination and interest in physical science they often perform better than girls in the science courses especially Mathematics.

Popoola (2013) revealed that the current situation in Nigeria is that the performance in Mathematics at the secondary school level has been generally poor, but on the average, female students tend to perform worse than male students. This raises a serious concern if the trend is not looked into, it will undermine gender equity in the Nigerian education system. Thus, there is need for all hands to be on deck to ensure that Mathematics performance improves together with maintaining gender equity at all levels of the Nigerian educational system.

The study conducted by Robinson and Lubienski (2011) showed that girls had obtained slightly better grades in Mathematics over the last four decades than boys. These findings were also supported by the findings of Brown and Kanyongo (2010). This evidently revealed that female students have chances of becoming more in sciences in the nearest future. Since the issue of students' gender and attitude in Mathematics is yet to be concluded, there is a need for gender issues to be considered in a study of this kind. Shelly (2016) identified the causes of the gender differences in Mathematics attitude to be multifaceted. He identified parental and societal attitudes, and students' classroom experiences as being influential in making female students internalise the feeling that they are inferior to male students in Mathematics. Nzewi (2010) observed that male students outnumber their female student counterparts in professions such as medicine, engineering, radiography among others and this has been prevalent and could be traced to the upbringing of female students and science-related disciplines. For instance in most homes what are regarded as complex and difficult tasks are allocated to boys whereas girls are expected to handle the relatively easy and less demanding tasks, and this has gone a long way, determining their flare or interest in Mathematics and other science courses.

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Location is a particular place in relation to other areas. The school location (rural or urban) is another factor that can affect the performance and attitude of students towards Mathematics.

Adebule and Aborisade (2013) examined location planning and their attendant consequences on the performance of students in various states of the federation. The location of schools (rural or urban) seemed to affect students' performance in Mathematics. Onah (2011) surveyed the works of different researchers on school location and achievement and found that there were sharp contrasts between urban and rural schools in terms of staff quality and instructional facilities. The researcher further added that while children in urban schools are taught by qualified and experienced teachers with adequate laboratory and workshop facilities to make them do well, the rural schools hardly have these opportunities. There are many qualified and experienced Mathematics teachers in an urban area than in a rural area. Many teachers do not want to be posted to the rural area of the state, and if such a teacher is posted to the rural area, many teachers find a way of getting back to the urban area of the state.

In a study conducted by Olasesan and Akaje (2018) investigated the influence of school location on secondary school students' achievement in Mathematics in Oyo State. The findings of the study showed that location, the rural and urban setting affects the achievement of students in mathematics significantly. The researchers recommended that government should bridge the gap between the rural and urban locations by providing the rural areas with qualified Mathematics teachers, instructional materials and social amenities which will enhance the better academic performance of students in Mathematics. Also, Alake and Ogunseemi (2013) asserted that students of schools in urban location had better academic achievement than their counter parts in rural location. However, Bosede (2010) showed that location has no effect on students' academic performance.

Many rural schools have strong ties with their community because of this; students feel comfortable in their school and are at their maximum potential for learning. Schools that make provision for or encourage the use of small group instructional mode no matter the location may be in a better position to enhance students' achievement in Mathematics.

A systematic analysis of the National Assessment Education Progress (NAEP) comparing rural and non-rural students' performance, NAEP discovered that Mathematics assessment showed that while rural and non-rural students had comparable levels of Mathematics performance in a particular year, and after some years, rural students overall had begun to outperform their non- rural counterparts. However, the performance varied considerably from state to state with rural students performing better in some states and significantly poorer in others. The difference in gains could be explained by variance in a broad range of schooling factors (instructional resources, progressive instructions, professional training, safe/ orderly environment and collective support (Adelabu, 2008). Suzanne and Lauren (2012) have it that students in rural school perform poorly in Mathematics because they do not always have access to the same level of federal funding as urban and suburban schools and this can limit the opportunity students have for learning Mathematics.

Location of schools could be a factor that affects the attitude of students towards Mathematics. The environment tends to influence the thinking, feeling and belief of learners. Onah (2011) stated that urban areas are those with high population density, great variety and

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beauty while rural areas are those with low population, subsistence mode of life, monotonous and burden. He stated further that school location means urban and rural schools. Akpan (2008) indicated that schools in urban areas have electricity, water supply, more teachers, more learning facilities and infrastructure, and as result schools in the urban areas achieved more than schools in the rural areas in science subjects. Based on the amenities within the locations, students' feelings and thinking can be enhanced. Students from rural area grow up with inferiority complex whenever they have encountered with their counterparts from the urban area. They most-time believed that those from urban areas can perform better than them. This belief can affect their learning ability in the subject, especially when they beginning to feel or think that Mathematics is more of abstracts (Bosede, 2010).

The finding of the study of Adebule and Aborisade (2013) showed that there was no significant difference between the attitude of secondary school students from rural and urban setting towards Mathematics. It can be concluded that school location does not determine the attitude of students towards Mathematics. On the contrary, Akpan (2008) was of the opinion that the location of the school would tell on the attitude of students towards Mathematics. He indicated that students who attended school in urban areas have a positive attitude towards Mathematics than their counterparts who attended school in rural areas.

Statement of the Problem

The report from WAEC statistical data and the observation of the researcher revealed that there is fluctuating performance of students in Mathematics over the years till date. Among many reasons that could be attributed to this include the problem of teaching strategy. The researcher personal experience showed that apart from the fact that Mathematics teachers are used to conventional chalk and talk strategy of teaching such as competitive, individualistic, teacher-centred strategies that are of low profit. It is observed that the gender of the students and school location may be factors causing the dwindling performance of students in Mathematics.

The dwindling performance in Mathematics had caused students' negative attitude to the subject which has been transferred to the generation of the younger ones. Researches have shown that female students are more affected by this appalling failure in Mathematics and that this frightens them and also hinder them from launching into Mathematics domain in terms of courses. For these reasons, the study examined the effects of gender and school location on students' performance and attitude towards Mathematics in Ekiti State, Nigeria.

Purpose of the Study

The purpose of this study was to;

i. determine the effect of gender on the performance and attitude of students towards Mathematics; and
ii. investigate whether or not there would be any effect in the performance and attitude of students in rural and urban schools towards Mathematics.

Research Hypotheses

1. There is no significant effects of gender on the performance of students in Mathematics.
2. There is no significant effects of gender on the attitude of students towards Mathematics.

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3. There is no significant effects of school location on the performance of students in Mathematics.
4. There is no significant effects of school location on the attitude of students towards Mathematics.

Methodology

The study adopted a descriptive research design of the ex-post facto. The population for the study consisted of all the Senior Secondary School Two (SSS II) students numbering 12,585 from 205 public secondary schools in the sixteen Local Government Areas (LGAs) of Ekiti State. The choice of SSS 1I students was considered more appropriate because the concepts to be taught are in SSS I1 Scheme of work and students had acquired the basic knowledge of the concepts in mathematics in senior secondary school one (SSS I). Also, SSS II students were not preparing for any external examination; hence, they were expected to be more readily available for the study. The sample for the study consisted of 200 SSS I1 students randomly selected from two rural and urban schools respectively. The samples were selected by using simple random sampling technique. This was done by selecting one Local Government Area from the state. Two schools were selected from the urban and rural areas respectively using simple random sampling technique. 50 students were selected from each of the schools to make it a total of 200 students. Two research instruments were used for this study. The instruments are; Students' Attitudinal Scale (SAS) and Mathematics Studies Performance Scores (MSPS). The validity of Students' Attitudinal Scale (SAS) was determined by professionals in Mathematics Education while the MSPS was not validated because it was used to collect scores of the students in Mathematics. The data collated from the SAS and MSPS were used for analysis. Inferential statistics of ANCOVA was used to test the hypotheses at 0.05 level of significance.

Results

Hypothesis 1: There is no significant effects of gender on the performance of students in Mathematics.

Table 1: ANCOVA of Students' Performance in Mathematics by Gender

Source	SS	df	MS	F	P
Corrected Model	1.751	2	.875	.045	.976
Covariate (Pretest)	.125	1	.125	.006	.946
Gender	1.741	1	1.741	.080	.765
Error	4010.345	197	19.374		
Total	77934.000	200			
Corrected Total	4012.095	199			

p>0.05

Table 1 revealed that the computed F-value (0.080) obtained for the groups with a p-value >0.05 was not significant at 0.05 level. The null hypothesis is hereby not rejected; implying that there was no significant effect of gender in the performance of students in Mathematics.

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Hypothesis 2: There is no significant effect of gender on the attitude of students towards Mathematics.

Table 2: ANCOVA of Students' Attitude in Mathematics by Gender

Source	SS	df	MS	F	P
Corrected Model	31.336[a]	2	15.668	.852	.528
Covariate (Pretest)	.857	1	.857	.047	.629
Gender	30.828	1	30.828	1.456	.138
Error	3806.664	197	18.390		
Total	837328.000	200			
Corrected Total	3838.000	199			

p>0.05

Table 2 revealed that the computed F-value (1.456) obtained for the groups with a p-value >0.05 was not significant at 0.05 level. The null hypothesis is hereby not rejected; implying that there was no significant effect of gender on the attitude of students towards Mathematics.

Hypothesis 3: There is no significant effect of school location on the performance of students in Mathematics.

Table 3: ANCOVA of Students' Performance in Mathematics by Location

Source	SS	df	MS	F	P
Corrected Model	144.735	2	72.367	3.873	.024
Covariate (Pretest)	.237	1	.237	.013	.850
Location	144.725	1	144.725	8.445	.056
Error	3867.361	197	18.683		
Total	77934.000	200			
Corrected Total	4012.095	199			

p>0.05

Table 3 revealed that the computed F-value (8.445) obtained for the groups with a p-value >0.05 was significant at 0.05 level. The null hypothesis is hereby not rejected; this showed that there was no significant effects of location on the performance of students in Mathematics.

Hypothesis 4: There is no significant effect of school location on the attitude of students towards Mathematics.

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Table 4: ANCOVA of Students' Attitude in Mathematics by Location

Source	SS	df	MS	F	P
Corrected Model	61.437	2	30.718	1.684	.178
Covariate (Pretest)	1.041	1	1.041	.057	.831
Location	60.929	1	60.929	4.640	.087
Error	3776.563	197	18.244		
Total	837328.000	200			
Corrected Total	3838.000	199			

p>0.05

Table 4 revealed that the computed F-value (4.640) obtained for the groups with a p-value >0.05 was not significant at 0.05 level. The null hypothesis is hereby not rejected; this implied that there was no significant effect of location in the attitude of students to Mathematics.

Discussion

The study examined the effects of gender and school location on students' performance and attitude towards Mathematics in Ekiti State, Nigeria. The finding from the analysis of data in this study was that there was no significant effects of gender on the performance of students in Mathematics. The null hypothesis was not rejected; implying that there was no significant effects of gender on the performance of students in Mathematics. This was in contrast to the result of Shelly (2016) that male students performed better in Mathematics and sciences generally than female students, but in consonance with Samuel and Samuel, (2016) that concluded that there was no gender effect in the teaching and learning of Mathematics.

The finding of the study also revealed that there was no significant effect of gender on the attitude of students towards Mathematics. The null hypothesis was not rejected; implying that there was no significant effect of gender on the attitude of students in Mathematics. This is in contrast to the result of findings of Arslan, Canh and Sabo (2012) who were of the opinion that female students showed more positive attitude towards Mathematics than male students, This also negates the findings of Ganley and Lubienski (2016) which established the fact that there were still gender difference in attitude of students towards Mathematics which affects learners' participation and retention and that the differences span through all levels of Mathematics. But the result corroborated the findings of Osman and Majeed (2017) who concluded that there was no significant difference between the attitude of male and female students towards Mathematics.

The finding of the study showed that there was no significant effects of location on the performance of students in Mathematics. The null hypothesis was not rejected, implying there was no significant effect of location on the performance of students in Mathematics. This result is in contrast to the findings of Olasesan and Akaje (2018) which showed that location, rural and urban settings affected the achievement of students in Mathematics significantly. However, Bosede (2010) showed that location had no effect on students' academic performance.

The results of this research revealed that there was no significant effects of location on the attitude of students towards Mathematics. This result supported the findings of Adebule and

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Aborisade (2013) which showed that there was no significant effects of the attitude of secondary school students from rural and urban setting towards Mathematics. It can be concluded that school location did not determine the attitude of students towards Mathematics. On the contrary, Akpan (2008) was of the opinion that location of the school told on the attitude of students towards Mathematics. He indicated that students who attended school in urban areas have a positive attitude towards Mathematics than their counterparts who attended school in rural areas due to staff quality and instructional facilities

Conclusion

Based on the findings of this study, it was concluded that gender had no effects on students' performance and attitude towards mathematics. School location had no effects on students' performance and attitude towards Mathematics.

Recommendation

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

1. There should be continuous promotion of gender equality among the students by the teachers, school management and the state government.
2. More schools should be located in a well conducive learning environment to enhance students' performance and attitude towards Mathematics.
3. The use of learners centred and activities based strategies in the teaching of Mathematics should be encouraged in schools so as to improve the performance and attitude of students towards Mathematics.

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