

Students' Mathematics Academic Performance: The Role Of School Size And Ownership

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Abstract: *The study explored the role of school size and ownership in students' mathematics academic performance. In the study, three research questions were answered and three hypotheses were tested at an alpha level of 0.05. In this study, an ex-post facto research design was used. 38,050 SS II students from the Delta Central Senatorial District made up the study's population. A total of 396 SSII students made up the study's sample. The Mathematics Achievement Test (MAT) and checklist were the instruments utilised in this study to collect data. The validity of the content was determined by the use of the test blueprint. The reliability of the Mathematics Achievement Test (MAT) was computed with Kuder-Richardson formula 21, and a reliability coefficient of 0.89 was obtained. Data were analysed using the Pearson product moment correlation coefficient, multiple correlation, and regression. The findings of the study indicate that: there is a significant correlation between school size and students' mathematics academic performance; there is no significant correlation between school ownership and students' mathematics academic performance; and there is no significant joint correlation among school size, ownership, and students' mathematics academic performance. Based on these findings, it was recommended that teachers make an effort to seriously reconsider their teaching strategies in light of the size of their school.*

Keywords: Mathematics, Academic Performance, School Size, school Ownership

INTRODUCTION

It is common knowledge that the quality of the educational system in a country directly affects that nation's ability to progress. People who have received an education are better equipped with the knowledge, abilities, and attitudes needed to live successfully. Therefore, investment in youth education is regarded as being of utmost importance in all countries, Nigeria included. Three distinct levels make up Nigeria's educational system: basic education (nine years), senior secondary education (three years), and higher education (four to six years, depending on the course of study).

The word academic performance is generally applied to academic status of a child in different subjects or as a whole it refers to the level of proficiency attained by the student. Academic performance plays an important role in the life of a student as it determines his or her placement in the academic institutions or job. As a result, a lot of guardians, parents, educators, students, and well-wishers are worried about how their kids can improve their academic performance. Numerous research about the factors that support academic performance have been prompted by the emphasis on it that is also widely felt throughout the world. It is inevitable that academic performance will play a part in predicting students' success, their academic placement in schools and higher education institutions, and their level of employability in the workforce (Osharive, 2015). One of the main objectives of a school is to measure academic success, which is determined by the outcomes of assessments. The primary purpose of schools is to convey knowledge and skills to its students, with the ultimate goal of improving their academic performance. The result of education is academic performance or achievement, which measures how well a student, instructor, or institution has met its learning objectives. Exams and ongoing assessments are frequently used to gauge academic achievement, but opinions on the most effective ways to assess it and whether declarative knowledge—such as facts—or procedural knowledge—such as skills—are more crucial vary (Santoveña-Casal, 2019; Stacy, 2018).

Academic performance is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are more important. Academic Achievement is the proficiency of performance of the student as denoted by marks assigned by the teacher in the test. There are two levels of academic achievement, High and Low Achievement. High and Low Achievement account for academic success and failure respectively. Researchers in the fields of philosophy, science, and education have been interested in measuring and predicting academic achievement. They have tried their hardest to identify and categorise important elements that may support academic performance. Finding the factors that predict academic success is another goal of the current study. The academic achievement of a school child in any school subject can be attributed to many factors. According to Adesehinwa and Aremu (2012), a variety of factors interact to affect pupils' academic achievement. These factors include, but are not limited to, socioeconomic position, the educational atmosphere, and ineffective teaching methods. Nonetheless, the researcher thought that physical factors like school ownership and size might also have an impact on how well students perform academically.

School size refers to the number of students enrolled in a given school. It can be measured in terms of the total number of students in attendance, the grade levels represented, or specific subgroups within the student body. Schools can be classified into different types based on school size. Small schools typically have fewer than 500 students. They offer a more intimate learning

environment and allow students to have closer relationships with their teachers and peers. Medium schools have a student population ranging from 500 to 1,000 students. They offer a balance between the size of small schools and the resources of large schools. Large schools have student populations exceeding 1,000 students. They often have the resources to support various extracurricular activities and facilities such as sports fields, auditoriums, and specialized classrooms. School size can have a significant impact on a student's educational experience. Large schools often offer a broader range of extracurricular activities, clubs, and sports teams, providing students with opportunities to explore their interests and develop leadership skills. Larger schools tend to have more resources, including libraries, computer labs, and specialized facilities, which can enhance the learning experience for students. Larger schools often have more resources available for scholarships and financial aid, which can alleviate the financial burden on students from low-income families. Large schools tend to have more diverse student populations, providing students with opportunities to interact with individuals from different cultural backgrounds and perspectives. Small schools often provide students with more individualized attention from teachers, making it easier for students to receive guidance and support. Small schools often foster a strong sense of community among students, teachers, and parents, creating a supportive environment that can contribute to academic success.

Thus School size may have a considerable impact on instructional activities, which can in turn affect academic performance. According to Lawhorn(2009) small increase in school size is associated with some favourable outcomes. Hence, academic performance may be predicted by school size. This means that there might be a correlation between school size and educational success. Instructional and learning activities may be more efficient if the school is smaller. Student academic performance may be better in small schools may be better than in larger school. Small schools have historically been more frequent in rural locations, and in less inhabited areas, they may need to be much smaller than in more densely populated places. Small schools' benefits might, however, be negated if they are underfunded or pushed to organise and function in the same manner that bigger schools do. Furthermore, the benefits of small school size may be seen in the number of students in each class that made up the school population. This means that a small school may invariably translate into small class size where teachers attend to small number of students in the school.

One definition of school ownership is an organisation that owns, manages, oversees, and runs a certain school. School ownership is the state or reality of possessing sole power and rights over a particular school (Nitin, 2020). The legal and administrative rights and obligations connected to running and overseeing a school are referred to as school ownership. It includes the ownership structure, governance, and decision-making procedures that dictate a school's course and day-to-day operations. The term "school ownership" describes the kind of organisation in charge of founding and running a school. It can be public, private, or charter. Each of these ownership types comes with distinct characteristics, resources, and educational philosophies. There are two key ways to look at school ownership. These are public and private schools. Any school operated and/or funded by the state or national government is referred to as a public school. A private school, on the other hand, is one that is funded and managed by religious/social organizations or other private organizations/individuals. There have been claims that school ownership is one factor that influences learning practices and, as a result, student success. There is also a common misconception in several areas of the world that pupils who attend private schools perform better than those who attend public schools. According to Ajayi (2016), school ownership may have an impact on how well pupils perform academically in a variety of areas, including mathematics. Furthermore, Philias and Wanjobi (2011) noted that the ownership of the school—private or public—could have a significant impact on the academic achievement of mathematics students. However, Keeves (2018) contended that the ownership of a school—whether it be private or public—had no bearing on how well pupils performed academically. Additionally, school ownership does not influence academic success in mathematics, according to Oke and Maliki (2010). The aforementioned facts suggest that there has been inconsistent research in the past between school ownership and academic performance. Hence, there is the need to also explore the role of school ownership in students' mathematics academic performance

Statement of the Problem

The teaching and learning of mathematics in secondary schools has encountered many issues recently that could prevent the accomplishment of the subject's goals. The underwhelming academic performance of learners in mathematics, particularly in senior secondary schools, has been a cause of concern for the nation's education sector's major players and successive governments. This indicates that different factors, like school size (small or large), and ownership (public or private), may play a critical role in the variations of academic performance of mathematics students. Due to the effects of school size, and ownership—on students' academic performance, there may be gaps or discrepancies in their performance. Therefore, the problem of this study is posed as a question; 'what is the role do school size and school ownership play on students' academic performance in Mathematics.

Research Questions

The following research questions guided the study.

1. Is there any correlation between school size and students' mathematics academic performance?
2. Is there any correlation between school ownership and students' mathematics academic performance?
3. Is there any joint correlation among school size, ownership and students' mathematics academic performance?

Hypotheses

The following hypotheses were developed and put to the test at alpha level of 0.05.

1. There is no significant correlation between school size and students' mathematics academic performance.
2. There is no significant correlation between school ownership and students' mathematics academic performance.
3. There is no significant joint correlation among school size, ownership, and students' mathematics academic performance.

Purpose of the Study

The main purpose of this study is to analyze the impact of school size and ownership on the academic performance of students in mathematics. Specifically, the study was design to:

1. investigate the correlation between school size and students' mathematics academic performance in the Delta Central Senatorial District.
2. examine the correlation between school ownership and students' mathematics academic performance in the Delta Central Senatorial District.
3. determine if there is any joint correlation among school size, ownership, and students' mathematics academic performance in the Delta Central Senatorial District.

Scope and Delimitation of the Study

. The independent variables are school size (small and large school) and school ownership (public and private) while the dependent variable is students' Mathematics academic performance. The study covered all senior secondary students in Delta Central Senatorial District. However, this study will be delimited to all senior secondary school II students in Delta Central Senatorial District.

RESEARCH METHOD

Research Design

In this study, an ex-post facto research design was used. The variables of interest in this design are uncontrollable, making it impossible for the researcher to change them.

Population of the Study

38,050 SS II students, comprising 22,158 public secondary school students and all 15, 892 private senior secondary school students in all 506 (190 public and 316 privately owned) secondary schools in Delta State's Delta Central Senatorial district during the 2020–2021 academic year, made up the study's population.

Sample and Sampling Technique

A total of 396 SSII students made up the study's sample. The sample size was determined by using the Yamane (1967) statistical procedure to select pupils from the whole population. The multi-stage sampling method was the sample technique employed in this investigation.

Research Instrument

The Mathematics Achievement Test (MAT) and checklist were the devices utilised in this study to collect data. Sections A and B comprise the Mathematics Achievement Test (MAT). The replies will be asked to provide information in section A, including the ownership type (public or private) of the school. Fifty multiple-choice questions from the 2018 West African Senior Secondary Certificate Examination make up Section B. Each item requested the respondents to choose the option that best answered the question, ranging from letter A to letter D. The principal of each chosen school was contacted using the checklist to obtain information on the size of the school.

Validity of the Research Instrument

The validity of the content was determined by the use of the test blueprint or table of specifications. The content of each concept was obtained uniform scheme of work for secondary school II (SS2) in Delta State. But for the purpose of this research, the instruments were given to an expert who further ascertained the content and face validity of the MAT.

Reliability of the Research Instrument

The reliability of the Mathematics Achievement Test (MAT) was determined by giving the instrument to 60 SS II students in three schools in Delta North Senatorial District in Delta State. The data obtained was used to compute the reliability of the instrument with Kuder-Richardson formula 21, and a reliability coefficient of 0.89 was obtained.

Method of Data Collection

To gather the data for the study, the researcher made in-person visits to each of the sampled schools. Upon arriving at each school, the researcher explained the reason for the visit and got permission from the principal. A research assistant and the class teacher helped the researcher give the MAT under strict examination settings to a few chosen pupils. The scripts were immediately gathered at the conclusion of the activity and subsequently marked. The data used in this study to describe the academic performance of the learners were their scores. The checklist was also used by the researcher to get principal data on school size.

Methods of Data Analysis

Data were analysed using the Pearson product moment correlation coefficient, multiple correlation, and regression. In the analysis Research questions 1 and 2 were answered using the Pearson product moment correlation coefficient, and research question 3 was answered using multiple correlation. Hypotheses 1 and 2 were tested using linear regression, while hypothesis 3 was tested using multiple linear regression. All the hypotheses were tested at an alpha level of 0.05.

Presentation of Results

Research Question One

Is there any correlation between school size and students’ mathematics academic performance?

Table 1: Simple Correlation Analysis of school size and students’ mathematics academic performance.

Variables	N	Mean	SD	r	r ²	r ² %	Remark
School size	396	30.84	8.11	.210	.044	4.40	Positive correlation
Academic performance	396	1.29	.46				

Independent Variable: School size, Dependent Variable: School size

Table 2 showed the Pearson Product Moment Correlation (r) value of 0.210 as the correlation between school size and students’ mathematics academic performance. The positive correlation indicates that as School size increases the level of students’ mathematics academic performance also increases. The coefficient of determination (r²) value of 0.044 indicated that School size contributed 4.40% to the variation in the level of students’ mathematics academic performance.

Hypothesis 1: There is no significant correlation between school size and students’ mathematics academic performance

Table 2: linear Regression Analysis of the correlation between school size and students’ mathematics academic performance

Model		Sum of Squares	Df	Mean Square	F	B	Beta	Std. Error	Sig.
1	Regression	1150.139	1	1150.139	18.249	3.735	.210	.874	.000 ^b
	Residual	24831.518	394	63.024					
	Total	25981.657	395						

P ≤ 0.05 level of significance; N = 396

Table 2 showed a linear regression output of the correlation between school size and students' mathematics academic performance. The computed F-value of 18.249 has a p-value of 0.000. Testing the null hypothesis at an alpha level of 0.05, the p-value of 0.000 was less than the alpha level of 0.05. Therefore, the null hypothesis was rejected. This indicated that there is a correlation between school size and students' mathematics academic performance.

Research Question Two

Table 3: Simple Correlation Analysis of school Ownership and students’ mathematics academic performance.

Variables	N	Mean	SD	R	r ²	r ² %	Remark
School Ownership	396	1.51	.50	.045	.002	2.00	Positive correlation

Academic performance	396	1.29	.46				
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Independent Variable: School size, Dependent Variable: School size

Table 3 showed the Pearson Product Moment Correlation (r) value of .045 as the correlation between school ownership and students' mathematics academic performance. The positive correlation indicates that as School ownership increases the level of students' mathematics academic performance also increases. The coefficient of determination (r²) value of 0.02 indicated that School ownership contributed 2.00% to the variation in the level of students' mathematics academic performance.

Hypothesis 2: There is no significant correlation between school ownership and students' mathematics academic performance.

Table 4: linear Regression Analysis of the correlation between school ownership and students' mathematics academic performance.

Model		Sum of Squares	df	Mean Square	F	B	Beta	Std. Error	Sig.
1	Regression	53.330	1	53.330	.810	.734	.900	.815	.369 ^b
	Residual	25928.327	394	65.808					
	Total	25981.657	395						

P ≤ 0.05 level of significance; N = 396

Table 4 showed a linear regression output of the correlation between school ownership and students' mathematics academic performance. The computed F-value of .810 has a p-value of 0.369. Testing the null hypothesis at an alpha level of 0.05, the p-value of 0.369 was greater than the alpha level of 0.05. Therefore, the null hypothesis was not rejected. This indicated that there is no correlation between school ownership and students' mathematics academic performance.

Research Question Three

Is there any joint correlation among school size, ownership and students' mathematics academic performance?

Table 5: Multiple Correlation(r) of school size, ownership and students' mathematics academic performance

Variables	N	Mean	SD	R	r ²	r ² %	Remark
School Size	396	1.29	.46				
School ownership	396	1.51	.50	.212	0.045	4.50	positive correlation
Academic performance	396	30.83	8.110				

Table 5 showed the Pearson Product Moment Correlation (r) value of 0.212 as the correlation among school size, ownership and students' mathematics academic performance. The coefficient of determination (r²) value of 0.045 indicated that school size and ownership contributed 4.50% to the variation in the level of students' mathematics academic performance.

Hypothesis three

There is no joint correlation among school size, ownership, and students' mathematics academic performance.

Table 6: Multiple Regression Analysis of School Size and School Ownership and Academic Performance of Secondary School Students in Mathematics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1164.763	2	582.382	9.223	.000 ^b
	Residual	24816.893	393	63.147		
	Total	25981.657	395			

		Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
		B	Std. Error	Beta			
1	(Constant)	25.472	1.626		15.664	.000	
	School Size	3.692	.880	.208	4.195	.000	
	School Ownership	.386	.803	.024	.481	.631	

$\alpha = 0.05$

a. Dependent Variable: Academic Performance

b. Predictors: (Constant), school size, school ownership

Table 6 showed a multiple regression output of among school size, ownership, and students' mathematics academic performance. The computed F-value of 9.223 has a p-value of 0.000. Testing the null hypothesis at an alpha level of 0.05, the p-value of 0.000 was less than the alpha level of 0.05. Therefore, the null hypothesis was not accepted. This indicated that there was joint correlation among school size, ownership, and students' mathematics academic performance.

Discussion of Results

The results of data analysis made above were discussed under the following headings:

School Size and Students Mathematics Academic Performance

The first finding of this study indicated that there was a significant correlation between school size and student mathematics academic performance of secondary school students. One plausible explanation for the relationship between school size and student mathematics academic performance is the allocation of educational resources. Larger schools tend to have a higher budget and more resources available, which can positively impact the quality of education. These resources may include well-equipped classrooms, sufficient number of qualified teachers, and access to technology. By providing students with the necessary resources and support, larger schools may create a conducive learning environment that fosters better mathematics academic performance. Another factor that may influence the relationship between school size and student mathematics academic performance is the teacher-student ratio. In smaller schools, teachers may have more time to spend individually with students, providing additional support and attention to their math learning needs. In contrast, larger schools with a larger student population may have a higher teacher-student ratio, resulting in less personalized instruction. The quality of instruction and individual attention received by students may play a significant role in their mathematics academic performance, with larger schools potentially offering less favorable conditions.

This result is consistent with that of Afolabi (2012), who found a substantial correlation between student learning outcomes and school size. The results corroborate those of Daso (2013), who discovered a noteworthy correlation between academic achievement of secondary school students in River State and school size. The results of Arop and Owan (2018), who discovered that school size affects secondary school pupils' academic performance, are in line with this conclusion. The results corroborate those of Kwesiga (2012), who argued that student academic performance is unquestionably influenced by the size of the institution where they attend. The results, however, were at odds with those of Gershenson and Langbein (2015), who revealed that there isn't a causal connection between academic achievement and school size.

School Ownership and Students Mathematics Academic Performance

The second finding indicated that there was no significant correlation between school ownership and student mathematics academic performance of secondary school students. The absence of a significant correlation between school ownership and student mathematics academic performance of secondary school students can be explained by the fact that Mathematics is a complex subject that requires a combination of various skills, including critical thinking, problem-solving, and logical reasoning. While school ownership may influence factors such as infrastructure, resources, and teacher quality, these alone may not directly influence student mathematics academic performance. Mathematics requires individual differences and talent. Some students may excel in mathematics regardless of school ownership, while others may require additional support and resources. Therefore, school ownership alone may not predict student mathematics academic performance accurately. The results are consistent with those of Alimi, et al., (2012), who found no discernible variation in students' performance across the two kinds of secondary schools. This result is consistent with the findings of Gamazo, et.al (2018), who demonstrated that there is no meaningful correlation between student performance and school ownership. This result, however, is at odds with the findings of Oluwaseun (2016) who demonstrated a substantial correlation between school ownership and students' academic achievement in mathematics. The results also contradicted those of Kim and Law (2012), who demonstrated that school ownership has a strong positive correlation with academic achievement in favour of public schools. This result also differed from those of Chaparro et al., (2020), who demonstrated a substantial association between school ownership and mathematics performance that favours private schools.

Joint Correlation among School Size, Ownership and Academic Performance

The third finding showed that there was a significant joint correlation among school size, ownership and academic performance. The significant joint correlation observed between school size, ownership, and academic performance suggests that these three factors may be interconnected and influence each other in various ways. School size can determine the availability of resources such as classrooms, laboratories, libraries, and sports facilities. Larger schools may have better access to these resources, leading to improved academic performance. Additionally, larger schools may have more specialized teachers, leading to better instructional quality and enhanced learning opportunities. Ownership status can influence the level of student support provided by a school. Privately owned schools may have more flexibility and resources to provide personalized attention and specialized services to students, which can contribute to their academic success. For example, private schools may have smaller class sizes, allowing for more individualized instruction and support. This finding could be due to the fact that a combination of school size, location, and school ownership in the area where this study was conducted go a long way in predicting students' academic performance. Ownership status can impact on the level of parental involvement and support. Privately owned schools may have a greater emphasis on parental involvement, as parents have invested financially in the school's operation. This involvement of parents can positively influence academic performance by providing additional academic support, monitoring, and encouragement. This finding is in line with Owan, *et al.*, (2019) who that school characteristics such as population, and ownership, influenced secondary school teachers' work effectiveness respectively. This finding is also consistent with Olurotimi & Nike, (2021) who showed that class size which is a product of school size impact students' performance.

Conclusion

Based on the findings from the study, there is a positive and significant correlation between school size and students' mathematics academic performance. Similarly, the study did not find a significant correlation between school ownership and students' mathematics academic performance. This suggests that the type of ownership, whether private or public, does not significantly influence students' mathematics achievement. However, the study did find a significantly positive joint correlation among school size, ownership, and students' mathematics academic performance. This means that school size and ownership both contribute to the academic performance in mathematics. This correlation suggests that larger schools, regardless of ownership, tend to perform better in mathematics compared to smaller schools. Additionally, private schools may also perform better in mathematics compared to public schools. In conclusion, the study findings demonstrate a significant correlation between school size and students' mathematics academic performance. Additionally, there is a positive joint correlation among school size, ownership, and students' mathematics academic performance.

Recommendations

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

- I. To improve academic performance in secondary schools, school management and teachers should work together to make intentional efforts to ensure that school size does not impede efficient instruction and learning;
- II. In order to assist students in improving their academic performance, teachers should make an effort to seriously reconsider their teaching strategies in light of the size of their school.
- III. Rather than blaming the school that their children attend exclusively for their subpar academic achievement, parents should urge the children in both public and private schools to work extremely hard for greater academic success;

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