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Spatial Distribution as Predictors of Students' Academic Performance in Oyo State Public Secondary Schools, Nigeria

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Abstract
This study investigated the joint and individual contribution of the independent variables (spatial distribution) as they relate to students' academic performance in Oyo State public secondary schools. Descriptive survey research method was adopted. Target population consisted of all students and teachers in selected public senior secondary schools in Oyo State. Four hundred (400) SS3 students out of 3,200 students representing 12.5% and 400 teachers out of 2,640 representing approximately 15% were selected using both stratified and simple random sampling techniques. Two instruments were used in collecting data; they are Spatial Distribution Questionnaire (r=0.78), and West African School Certification results in English language and Mathematics for 2010/2011. Multiple regression analysis and Analysis of Variance statistical methods were used in testing the nine hypotheses generated for the study at 0.05 level of significance. The findings revealed that there was significant contribution of Spatial Distribution to Students' performance scores in English Language and Mathematics examination; Students' performance scores of urban located schools in English language and Mathematics examinations; Students' performance scores of rural located schools in English language and Mathematics examinations. Based on the findings, it was recommended that government should involve educational planners and other experts before sitting schools so as to avoid arbitrary location of schools, spatial distribution components should be taken into consideration in school location

Keywords: spatial distribution, predictors, academic performance, Oyo State, public secondary schools

INTRODUCTION

The performance of students in any academic task has always been of special interest to educators, parents and society at large. The primary concern of any educator who is entrusted with the responsibility of selecting students for any advance training programme in a given field is the ability to estimate as accurately and as early as possible, the probability that such candidates will succeed or fail. The problem of poor academic performance is so great that it has become a necessity for many students to pass the number of subjects required for admission into tertiary institutions at once (Ajayi, 2011).

A closer look at the Senior Secondary Certificate Examination results (SSCE) released by West Africa Examinations Council will further substantiate one's lamentation about the present poor performance in different school subjects of secondary school students (Olagunju, 2012).

Table 1: West African Examination Council (WAEC) performance in the Senior School Certificate Examination May/June, 2007-2012 English Language and Mathematics with 3 other subjects. Credit A1-C6; Pass D7-E8; Fail F9

Year	Total No. of Candidates	Passed English Language and Mathematics with 3 other subjects	Percentage of Passed
2007	1,275,466	325,754	25.5
2008	1,369,426	188,442	13.76
2009	1,373,009	356,981	25.9
2010	1,351,557	337,071	24.9
2011/12	1,540,250	587,630	38.93

Source: Federal Ministry of Education, 2012; Statistics Office, WAEC, Lagos, Nigeria May/June (2011/2012).

The quality of the products of the present educational system in Nigeria is so poor, most notable is their written and spoken skills in English Language and this is well shown in the SSCE – WAEC examinations results. It is not an over-statement that the rate of failure in English Language at the senior certificate examination level in Nigeria is alarming. Regrettably, communication in English language is a sine qua non to good academic performance while in school and during a fulfilled life thereafter (Akinbode, 2006).

English language, apart from being the medium of instruction in the Nigerian secondary schools, is

learnt as a special subject. It is the vehicle through which the Nigerian secondary school students communicate. A credit pass in English language is also a pre-requisite for gaining admission to the higher institutions in Nigeria. Okereke (2006) states that Mathematics is the science of thing that have a pattern of regularity, logical order and finding and exploring the regularity. Mathematics is the foundation of science and technology and the functional role of Mathematics to science and technology are multifarious, that no idea of science, technology and business enterprise escape its application. Besides its importance, it is observed that Mathematics is one of the most poorly taught, widely hated and abysmally understood subjects in secondary schools.

Okereke further attributes students' poor performance to factors such as the society's view that Mathematics is difficult, shortage of qualified Mathematics teachers, lack of Mathematics laboratory among others (Okereke, 2006). The ability of the students to think critically and tackle Mathematical problems is also lacking and not well developed. These two core subjects' English language and Mathematics are very important for the present technological challenges (Olagunju, 2012) and even government, parents and guardians are complaining about this situation.

This deplorable condition, when compared with huge sums of money spent on education annually, demands an urgent attention . (Adeniji, 2003). This situation informs many research efforts like those of Akinwumiju and Orimoloye, (1997); Obilade, (2006) and Oladebo, (2006) which are pre-occupied with factors that are responsible for the dismal state of education in the country. Among the reasons adduced for this mass failure of students in public examinations include spatial distribution (aesthetics, school location, topography, catchment and population, accessibility and experts) .

According to Aremu (2012), researchers who focus on the academic performance of students have continued to examine diverse phenomena that have been found to predict performance. He also contends that there has been a number of reviewers or researchers that have critically examined the relationship between certain explanatory constructs and academic performance with diverse findings. Yet, the battery of variables used to predict students' academic performance in formal face-to-face educational situations, may not adequately serve as predictors of academic performance (Kumar,2012).

Students' academic performance rested on spatial distribution (school location, accessibility, aesthetics, catchments and population, topography, proximity to utility, neighborhood/cultural, and experts). Many parents believed that academic performance of students in urban schools is poor compared with academic performance of students in rural schools and therefore enroll their wards in the rural schools for Senior School Certificate Examinations (Owoeye & Yara, 2011) but Obe (2004) observed a significant difference in rural-urban academic performance. He concludes that students from urban schools were superior to their rural counterpart. As school population continue to improve, the influence of spatial distribution on academic performance is generating more research interest. However, some studies like Daini and Oyeromi (2006), Aremu (2012) and Kumar (2012) have examined spatial distribution and their attendant consequences on examined performance of students in various state of the Federation.

The area where a school is located is expected to affect the students' academic performance due to the fact that the location is linked with the teacher's retention and provision of school resources such as textbooks, instructional materials and laboratory equipment. It has been observed by Owoeye (2000) and Ayodele (2000) that most of the public secondary schools in the Western Zone of Nigeria (Oyo, Ogun, Osun, Ondo, Ekiti and Lagos states) are arbitrarily located and distributed thereby resulting in poor students' academic performance. In the study by Daini (2005) on school location and students' academic performance in Ogun state public secondary school, she found that decrease in students' academic performance could be traced to school location. Schools located near motor parks, mechanic village where sound or noise distract students' attention may likely affect their performance. Schools located at the rural areas may likely suffer some education resources. This is because teachers may refuse appointment and this only one reason among many other reasons.

The school site should be readily accessible to students and staff by both public and private transportation. The site should be located within 1.5 kilometers of student's residence and there should be minimum of dangerous highway crossings. The students must have a safe way to return home from school after evening activity and in all season of the year. In the study conducted by Daini (2005) she observed that long distances to most schools affect the students' academic performance in the sense that, most students may not reach school until noon. The location of school should ensure proximity to build up areas.

Furthermore, consideration for natural beauty (aesthetics) should be stressed in the selection of the site. Natural beauty is as important as the buildings and facilities to be provided on the site. Natural features like trees, shrubs, flower beds, beautiful sceneries should be provided to enhance the image of

the school and to produce dramatic results in school performance. In the study by Webb and Chan (2004) on the influence of aesthetics and students' academic performance, a strong relationship that is aesthetics was found to have contributed to the high performance of students.

Moreover, topography and soil conditions such as the contours and distribution of natural elements such as soil, rocks, water and sand require careful study in view of the expected utilization. Danenberg (2001); Al-Enezi (2002) and Perry (2002) also confirmed that elements found in schools are important factors that contribute to the creation of good learning environment and students' academic performance.

So also, spatial distribution and students' academic performance in English language and Mathematics has been widely reported with conflicting reports. Adepoju (2001) observes that students in urban schools manifested more brilliant performance than their rural counterpart. Also, Ogunleye (2002), Ndukwu (2002) and Odinkwo (2002) reported a significant difference in the performance of students in urban areas. However, Daramola in Ogunleye (2002), does not find any significant difference in the urban schools. In view of these conflicting reports and huge amount of money spent on education by the government, there is need to carry out a study with a view to determining which of the selected variables will predict the students' academic performance in SSCE English language and Mathematics in Oyo State, Nigeria. Therefore, this study set out to investigate the spatial distribution and institutional factors as predictors of students' academic performance in public Senior Secondary Schools, Oyo State, Nigeria.

Objectives of the Study

The objectives of this study were to examine the contributions of spatial distribution on students' academic performance in school certificate examinations with respect to English language and Mathematics in Oyo State with a view to bringing out optimal productivity.

Statement of the Problem

The perennial poor performance of candidates in the Senior School Certificate Examination in the last five years has generated serious concern among educators, researchers and the general public. Studies in the past have devoted much attention to student and teacher factors in predicting students' academic performance with little or no attention paid to spatial distribution . In order to fill this yearning gap, this study is set to determine the extent to which spatial distribution (school location, aesthetics, accessibility, topography, catchment, population) will individually and jointly predict students' performance in English Language and Mathematics in the Senior Secondary School Certificate Examination.

Hypotheses

Three hypotheses were generated and tested for this study

Hypothesis One: There is no significant contribution of spatial distribution to students' performance in school certificate examinations in English Language and Mathematics.

Hypothesis Two: There is no significant contribution of spatial distribution to students' performance scores of urban located school in SSCE English Language and Mathematics examinations.

Hypothesis Three: There is no significant contribution of spatial distribution to students' performance scores of rural located schools in SSCE English Language and Mathematics examinations.

Research Design

A descriptive survey research design was employed in this research. This is because the independent variables (Spatial Distribution) being studied have already occurred. What would be done is to carry out the observation of dependent variable (students' academic performance) and bend backward to examine the independent variables for their possible prescription of the dependent variable.

Population

The population involved all the Senior Secondary School (SSS3) students and teachers in senior secondary schools in all the public senior secondary schools in Oyo-State. Data available as at the time of data collection for this study indicated that there are 3,200 SSS3 students and 2,640 teachers in Senior Secondary schools in all the 400 public secondary schools (Oyo State Ministry of Education, 2012).

Sample and Sampling Techniques

Stratified and simple random sampling method was used to select the local government areas, the schools, teachers and students. Oyo State has 33 local government area. One out of three was picked that is Ibadan central Senatorial District. The local government was stratified and 11 local government areas were selected representing 33.3%. The Local Government has 5 urban local government and 6 rural dichotomy. Teachers' Sample: teachers teaching senior secondary schools classes in each school were used for this study. Ten (10) teachers were sampled in each school totaling 400 teachers for the study out of 2,640 teachers representing approximately 15 percent. This was done using simple random sampling. Students Sample: SS3 students in the year 2011/2012 session were used for this study. Ten (10) students were randomly selected from SS3 students from each of the 40 sampled schools, totaling 400

students out of 3,200 students representing 13 percent for the study. The calculations of academic performance for each school in English Language and Mathematics were done for 2010/2011 session using WAEC result.

Instrumentation
Research instrument was used for this study. Spatial Distribution Questionnaire developed by Olaniyonu (1987) and pro forma for students' results in SSCE English language and Mathematics. Details of the description of the instruments including their validity and reliability are presented as follows:

Spatial Distribution Questionnaire (SDQ)
Spatial Distribution Questionnaire for students and teachers was developed by Olaniyonu (1987). The instrument was designed to seek information from the students and teachers on spatial distribution. The instrument is made up of two sections, A and B. Section A contains items to measure the demographic data, while section B of the instrument contains items that seek information on school location, accessibility, size of the land, traffic and related safety, aesthetic, catchment, population, and experts, neighborhood/cultural , topography and proximity to utility services. It consists of seven sub-sections. Section A with 3 items, section B with 4 items, section C with 4 items, section D with 3 items, section E with 4 items, section F with 5 items, section G with 6 items, section H with 5 items, section I with 1 item and section J with 6 items all together 40 items. Respondents are instructed to please indicate YES or NO. Items with YES scored one (1) and items with NO are scored zero (0).

This instrument was adopted for the study. Olaniyonu (1987) showed that the instrument has sound psychometric properties. He reported that the instrument has high internal consistency with Chronbach alpha ranging from 0.68 to 0.70 and two week test-retest reliability coefficient of 0.78. Spatial Distribution Questionnaire has been used extensively in the southern part of this country with senior secondary school students (Benjamin (1998), Ayodele (2000), Owoeye (2000), Daini and Oyeromi (2006) with Cronbach alpha ranging from 0.72 to 0.93. The scale is one of the most readily available instruments on spatial distribution. To test the reliability of the instrument, the test re-test methods of two weeks interval was used in six secondary schools (3 rural and 3 urban) outside the study. This constituted the trial study group. Altogether, 30 teachers and 30 students participated in the pilot test. Two weeks later, the instruments were re-administered to the same respondents. The reliability index for Spatial Distribution Questionnaire was 0.78

Method of Data Collection The researcher employed research assistants. The researcher trained the research assistants on the subject of the study. The research assistants were the students on teaching practice to secondary schools in Oyo State. In addition, letters of authority to collect the required data from the subjects were given to the research assistants. The researcher was in contact with the research assistants regularly by the means of tele-communication system. The research assistants were given an orientation on the research and how to carry out the administration of the questionnaire. This allowed the researcher to actually give explanation where necessary and to collect the questionnaire immediately where possible from both teachers and students.

The researcher and his assistant were involved in the administration of the instruments. At the end of the process of data collection, all the 800 instruments on both teachers and students were fully completed and returned. However, the researcher personally visited each of the school sampled principals to collect the Senior Secondary Council Examination result in English Language and Mathematics for 2010/2011session.

RESULTS
Test of Hypotheses
Hypothesis One: There is no significant contribution of spatial distribution to students' performance in school certificate examinations in English Language and Mathematics.

Table 1: Contribution of Spatial Distribution to Students' Performance Scores in English Language and Mathematics

Model	Sum of Square	Df	Mean Square	F	Sig
Regression	5.695	1	5.695	8.433	.004*
Residual	538.837	798	0.675		
Total	544.532	799			
R	. 0.102				
R^2	0.010				
$R^2_{(adj)}$	0.009				

* indicate significance F at □ =0.05

The result revealed in table 1 revealed significant outcome (F=8.433, p<.05). This outcome showed that spatial distribution alone significantly contributed to the variance in the students' performance scores in English language and Mathematics. The Table further revealed that spatial distribution alone accounted for 1.0% ($R^{2=}$0.010) of the variance in the dependent variable. As a result, the null hypothesis two is hereby rejected. Hence, there is significant contribution of spatial distribution to students' performance scores, accounting for just 1% of the variance in the dependent variable.

Hypothesis Two: There is no significant contribution of spatial distribution to students' performance scores

of urban located school in SSCE English Language and Mathematics examinations.

Table 2: Contribution of Spatial Distribution to Urban Located Students' Performance Scores

Model	Sum of Square	Df	Mean Square	F	Sig
Regression	2.509	1	2.509	6.269	0.013
Residual	159.314	398	0.400		
Total	161.824	399			
R	0.125				
R^2	0.016				
$R^2_{(adj)}$	0.013				

* indicate significance F at □ =0.05

The result in table 2 revealed significant outcome (F=6.269, P<0.05). This outcome implied that spatial distribution alone significantly contributed to the variance in the urban located students' performance scores in school certificate examinations in English Language and Mathematics. The result in table 2 revealed that, spatial distribution alone accounted for 1.6% (R^2 =0.016) of the variance in the dependent variable. As a result, the null hypothesis five is rejected. Hence, there is a significant contribution of spatial distribution to students' performance scores of urban located schools, accounting for more than 1% of the variance in the dependent variable.

Hypothesis Three: There is no significant contribution of spatial distribution to students' performance scores of rural located schools in SSCE English Language and Mathematics examinations.

Table 3: Contribution of Spatial Distribution to Rural Located Students' Performance Score

Model	Sum of Square	Df	Mean Square	F	Sig
Regression	8.398	1	8.398	8.666	0.003*
Residual	385.701	398	0.969		
Total	394.099	399			
R	0.146				
R^2	0.021				
$R^2_{(adj)}$	0.019				

* indicate significance F at □ =0.05

The result in table 3 revealed significant outcome (F= 8.666, P<0.05). This implied that spatial distribution alone significantly contributed to the variance in the rural located students' performance in school certificate examinations in English Language and Mathematics. The table further revealed that spatial distribution alone accounted for 2.1% (R^2 =0.021) of the variance in the dependent variable. As a result, the null hypothesis eight is rejected. Thus, there is significant contribution of spatial distribution to students' performance scores of rural located schools in SSCE English Language and Mathematics examinations.

DISCUSSION

Hypothesis One. There is no significant contribution of spatial distribution to students' performance in school certificate examinations in English Language and Mathematics. The hypothesis was rejected. The outcome shows that spatial distribution significantly contributed to the variance in the students' performance scores. Schools located in a comfortable environment are accessible to both teachers and students. Most of the schools were adequately located in comfortable environments and this enhance meaningful learning for students. This result aligns with the findings of Lemasters (1997); Lackney (1999); Cotton (2001) & Schnelder (2002) whose opinions highlighted that spatial distribution (school location, accessibility, catchment) are important factors influencing students' academic performance.

So also, Olaniyonu (2000), opined that a school site should be situated where it can be readily accessible to staff and students. This finding corroborates with that of Afolabi (2002); Ezeasor (2003), Portermages (2004) and this emphasizes that positive relationship exists between spatial distribution and students' academic performance.

However, Olatoye (2002) did not find direct significance between spatial distribution and students' academic performance. He noted that there are other factors that could be educationally important about a school, though the school may be located in rural area. He further observed that some schools may be located in rural areas but have adequate facilities to provide meaningful learning for their students.

Hypothesis Two. There is no significant contribution of spatial distribution to students' performance scores of urban located school in SSCE English Language and Mathematics examinations. This hypothesis was rejected that is, spatial distribution alone significantly contributed to the variance in the urban located students' performance scores in English Language and Mathematics .This might be as a result that most schools located are accessible to students and teachers. The schools in urban area were located in conducive area which enhanced learning and improved students' academic performance. Most of the schools were not located near Motor Park and all the market shops erected at the gate and surrounding of the schools were demolished. Hence, students concentrated on their study. The result might also be as result that there are adequate and qualified teachers. This is in line with the study by Okonkwo(2000) in his study on spatial distribution and students' academic performance, he found that spatial distribution has a strong effect on students' academic performance in urban located schools.

Hypothesis Three. There is no significant contribution of spatial distribution to rural located students' performance scores Certificate in English Language and Mathematics examinations. The hypothesis was rejected. Spatial distribution alone contributes significantly to students academic performance scores of rural located schools in senior certificate examination in English Language and Mathematics. The research found that despite the fact that schools are many in urban areas, the distance students covered are far and most of the parents cannot afford the transport fare cum feeding, so students get to school late thereby resulting to student truancy and poor academic performance. In some urban schools, the late comers are so many that they serve one punishment or the other thereby wasting their time.

This finding corroborates that of Olutola (1980) cited in Lawani (2004) that in a more functional setting, the school environment sets the tone of the school in terms of academic performance. Distance of school has been identified as a factor that may discourage female participation in schooling as parents may be unwilling to allow their female children to travel long distances alone for fear of their safety. Lack of physical access to schooling has been identified as a major cause of drop out in schools.

The finding is in line with Strickland and Chan (2002) who proposes that a beautiful school is a caring school. The school building should be planned in a peaceful and tranquil setting that harmonized with the community architecture, beautiful land scaping and a well maintained appearance helps project a positive and caring image. So also, Olaniyonu (2000) opines that consideration for natural beauty should be stressed in the selection of a site. Natural features like trees, shrubs, flowerbeds, beautiful sceneries should be provided to enhance the image of the school and these can produce dramatic result in school performance. The finding of this study corroborates with that of Gbadamosi (2001), who found that rural schools seem to utilize more academic resources than urban schools. This, he explained might be due to the fact that teachers in rural schools engaged the students more since there were no many activities that might distract their attention like trading or going on recreational activities. This study contradicts the finding of Adepoju (2001) that students in urban schools manifest more brilliant performance than their rural counterparts.

CONCLUSION

Based on the findings and the discussions of this study, the following conclusions are drawn. This study shows that spatial distribution variables contribute to students' academic performance scores of urban and Rural located schools in School Certificate Examinations in English Language and Mathematics.

RECOMMENDATIONS

It is therefore recommended that government should handle spatial distribution of schools with extreme care. Schools should not be arbitrarily located and politicize. So also, laboratory equipment, library and other instructional material should be looked into. Large class size should be reduced to minimal which can be handled by teachers. More qualified teachers could be employed to handle core subjects such as English language and Mathematics instead of using PTA teachers and NYSC to teach. This study also revealed that spatial distribution contributes to students' performance scores in school Certificate Examinations in English language and Mathematics. It is therefore recommended that government should follow the UNESCO recommendation on students' journey to and fro schools hence, the students' journey to the school should not exceed 1.5 kilometer. Government should ensure that the catchment area and population must also be considered before given admission to students. So also, government could provide school bus that will convey both students and teachers to their various schools.

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