INFLUENCE OF CLASS-SIZE, TEACHER VARIABLES AND SCHOOL LOCATION ON SENIOR SECONDARY SCHOOL STUDENTS' MATHEMATICS ACHIEVEMENT IN KOKONA LGA, NASARAWA STATE, NIGERIA

Tanimu, O.

Abstract

The study investigated the influence of class-size, teacher variables and school location on senior secondary school students' mathematics achievement in Kokona LGA, Nasarawa state, Nigeria. The population and the sample of the study comprised 21 mathematics teachers and 1,674 SS II students that sat for 2018 mathematics mock examination in 18 senior secondary schools (5 from urban and 13 from rural) in Kokona LGA. Four research questions and four hypotheses were used for the study. The study adopted ex-post facto survey design and profomas were used to collect the data for analysis. Mean and standard deviation were used to answer the research questions while t-test and ANOVA were used to test the hypotheses at 0.05 level of significance. The results obtained revealed that students taught in small class-size significantly achieved higher than their counterparts in large class-size classes also there is no significant difference in the academic achievement of students taught by qualified teachers and those taught by unqualified teachers. The findings also showed that students taught by experienced teachers had significantly higher performance than those taught by less experienced teachers; Student from rural schools performed significantly higher than the counterparts from urban schools. The study recommended that schools should stick to the 40:1 student-teacher ratio as stipulated by the National Policy on education; government should mandate and motivate teaching professionalism among teachers stay in the teaching profession. Also government through ministry of Education should monitor equal distribution of experienced teachers to schools located in both rural and urban areas as it is discovered that teachers with higher experience made students perform better. Finally government should mandate and motivate teachers that are posted to schools in rural areas with allowances to make them stay and perform their work diligently.

Keywords: *Class-Size, Teachers' Variables, School Location and Academic Achievement.*

Introduction

Nigeria has been bedeviled with students' poor achievement in secondary school final examinations such as Senior Secondary School Certificate Examinations (SSCE), National Examination Council (NECO), National Business and Technical Examination Board (NABTEB) since 1980s. This has led the Federal and State governments adopting different strategies and policies to deal with this situation. A survey by the Federal Ministry of Education on the performance of the educational sector in the different geo-political zones and states of the country revealed that there were gaps in the achievement with the North Central Zone recording one of the least achievements (FMOE, 2001). Nasarawa State being one of the states in North central zone recorded also lowest achievement in Senior Secondary School Certificate Examinations. Kokona Local Government Area (LGA) which is in Nasarawa state is not an exceptional of the ugly situation.

Data collected by the Nasarawa State Education Resource Centre shows that between 1996-2002, only an average of 2% of public secondary schools students passed their SSCE, the actual figure ranged from 0.81% in 1996 to 1.08% in 2001 and 5.28% in 2002.In the year 2003, about 26,000 candidates sat for the examination band only 2,078 or 8.0% candidates passed. In the year 2004, about 25,000 sat the examination with only 557 0r 2.2% candidates being qualified for university entirely. In 2010, only 15.97% candidates passed, 2013 only 9.02% of the candidates passed the SSCE, while in 2014, 12.30% of the candidates qualified for admission into the university. In 2017 and 2018 Nasarawa state was ranked 22nd and 23rd for the number of students that pass WAEC with five credit and above including mathematics and English.

The Nigerian educational system has continuously experienced an upward trend in school enrolment at all levels since the introduction of the Universal Primary Education (UPE) in the 1970s and the Universal Basic Education (UBE) in 1994. This may have in turn impacted on the class size in terms of the population of the individual classrooms with more enrolment in the schools that are located in communities along the major roads and urban areas than in the remote areas. The National Policy on Education (NPE, 2016) stipulates that the teacher-student's ratio in the secondary schools should be 1:40. Wosayanju, in Babatunde (2013) maintained that large class may pose some teaching challenges such as delayed feedback, resulting in inefficiency, poor quality of students, and reduction in teaching with less assignment so as to reduce the burden of marking, all of which may encourage shallow learning.

The quality of education also depends on the teacher as reflected in the performance of their students. Teachers play crucial role in the educational attainment of students because they are ultimately responsible for translating into actions the principles based on practice during interaction with the students. Teacher variables such as qualification, motivation and experience may be contributing factors to students output. Unanma. Abugu, Dike and Umeobike (2013) examined the relationship between Teachers' academic qualifications and academic achievement of Senior Secondary school Students in Chemistry and discovered that there is a positive relationship between the variables. This was supported by the findings of Adeyemi (2014) in the reports to analysis the performance of the English Language Teachers (ELTs) and Teachers with Formal Education (TFEs) at secondary level in public high schools. Adeyemi's results show that those students who receive instruction from the ELTs show better results in the final examinations as compared to those who receive input from the TFEs. Boyd, Lankford, Loeb and Rockoff (2008) discovered that improvements in teacher qualifications, especially among the poorest schools, appear to have resulted in improved student achievement. Richardson (2008) indicated that a significant relationship does exist between teacher qualifications and student achievement. Yusuf and Dada (2016) stated that a highly effective teacher is one whose students show the most gains from one year to the next and the effect of teaching on student learning is greater than student ethnicity or family income, school attended by student or class size.

Ogbonnaya (2009) suggested that if all mathematics teachers have a degree, are specialized in mathematics or mathematics education and have more than five years teaching experience, the students' achievement in mathematics would likely improve. Richardson (2008) also concluded that if the teacher has a traditional secondary mathematics certification then students will tend to score higher on the ARMT compared to teachers with alternative certification.

There is the tendency for qualified teachers to seek deployment in schools located in rural area to ones in urban/villages along major roads, particularly in the LGA capitals where more school facilities and services tended to be concentrated. Teachers with the highest training are posted to largest cities, and even more noticeably to the capital. This and more findings abound on the disparity in the quality of teachers in urban schools compared to those in remote areas, which consequently affect students' academic performance. Ibukun (1988) in his investigation observed that teachers in urban secondary schools in Ondo State tend to be better qualified pointing out that there was no deliberate government policy supporting such lopsided resource allocation. In his conclusion, he said rural schools probably become progressively poorly staffed arising from personal refusal of teachers to serve in remote locations. In such location, their pattern of school lives are characterized by dilapidated buildings, which form extension to old ones thus forming a sort of patchwork with others, growing too old and no longer viable.

The low performance of the students in the Senior School Certificate Examination (SSCE) in recent years formed the crux to this study. Students' performances are obtained from examination scores which are transformed to grades. As a measure of students' learning outcomes, examination occupies an important position in the Nigerian educational system as a measure of quality (Adeyemi, 2008). The pattern of grading candidates' scores in the examinations was such that the distinction grade was represented by A1 to B3. The credit grade was represented by C4 to C6. The ordinary pass grade was represented by D7 and E8 while the failure grade was represented by F9. It needs to be mentioned however, that the distinction and credit grades are the only requisite qualifications for admissions into universities in Nigeria and candidates must have at least five credits in five subjects including English Language and mathematics in order to qualify for admission (Joint Admissions and Matriculation Board, JAMB 2002). The continuous failing of students on external examination have been attributed to many factor which include but not restricted to classroom size, school location and teachers variables in terms of qualification and work experience. Therefore, this study sets to find out the interactive influence of class size, teachers variables like qualification, motivation, and experience, school location on students' academic performance in senior secondary schools in Kokona LGA of Nasarawa State.

Research Questions

The following research questions guided the study.

1. What are the mean achievement scores of students in the large and small class-size?
2. What are the mean achievement scores of students taught by qualified teachers and those taught by unqualified teachers?

3. What are the mean achievement scores of students taught by experience and less experience teachers?
4. What are the mean achievement scores of students in urban and rural schools?

Research Hypotheses

The following null hypotheses were formulated to serve as a guide to the researcher:

1. There is no significant difference in the mean academic achievement of senior secondary school students taught in large and small classes.
2. There is no significant difference in the mean academic achievement of senior secondary school students taught by qualified teachers and those taught by unqualified teachers.
3. There is no significant difference in the mean academic achievement of senior secondary school students taught by experienced teacher and those taught by less experienced teachers.
4. There is no significant difference in the mean academic achievement of Senior Secondary School students in rural and urban areas.

Methodology

Research design for this study was ex post facto design method. The justification for the choice of this design is due to the fact that this study explore cause and effects relationships where cause already exist and cannot be manipulated (Anikweze, 2015). It uses what already exist and looks backward to explain why. This design was chosen for this study because the students had already written the state mock examination in mathematics, hence the study simply seek to find out the effect of the class size, teacher qualification and experience and school location on their performance in the State mock Examination in mathematics. The researcher does not intend to manipulate the condition on ground.

The population of this study comprises all 21 mathematics teachers and 1,674 SS II students in 2017/2018 academic session that sat for 2018 mock examination in 18 senior secondary schools (5 from urban and 13 from rural) in Kokona LGA. All the teachers and students were used as subjects of the study.

The researcher designed two profoma: 1). Teacher Variables, School Location and class size (TVSLCS) which was used to collect information relating to teachers' variables (teaching qualifications and teaching experience), schools location and class size and 2) Student Performance Inventory (SPI) which was used for collecting students' performance.

Teachers teaching qualification of NCE, B. Ed, M. Ed Ph.D. are classified as qualified while teachers with B.sci, M. SCci, HND without PGDE are classified as unqualified, Class with up to 40 students is classified as small class size, while class with over 40 student is classified as large class size. Teachers that have taught between 1-3years are classified as less – experienced, while those that have taught over 3 years are classified as experienced. Schools

located at the local government headquarters and along the major roads are classified as urban schools while those located out of these are classified as rural schools.

Students' mathematics Results of mock Examinations conducted in 2018 were collected and were assigned points (A1 to F9), where A1=9, B2=8, B3=7, C4=6, C5=5 C6=4, D7=3, E8=2 and F9=1

The data collected were analyzed using mean and standard deviation to answer the research questions while Independent t-test and the ANOVA Statistics to test the research hypotheses. All hypotheses were tested at 0.05 level of significance.

Results

Research Questions One: What are the mean achievement scores of students in the large and small class-size?

Table 1: Mean and Standard Deviation of Academic Achievement of Students Taught in Large and Small Class-size

Variable	No of stdts	Scores obtained	Mean	Std. Deviation
Large classes	967	4, 456	4.61	1.96
Small classes	707	3,867	5.50	1.38

From Table 1, the mean and standard deviation of students taught in large class size was 4.61 and 1.96 was less than mean and standard deviation of students taught in small class size which was 5.50 and 1.38. This means that students taught in small class-size academically achieved more than students in large class-size.

Research Questions Two: What are the mean achievement scores of students taught by qualified teachers and those taught by unqualified teachers?

Table 2: Mean and Standard Deviation of Academic Achievement of Students Taught by Qualified and Unqualified Teachers

Teachers qualification	No of stdts	Scores obtained	Mean	Std, deviation
Qualified teachers	955	5,642	5.91	0.55
Unqualified teachers	719	3,523	4.90	1.44

From Table 2, the mean of academic achievement of students taught by qualified teacher 5.91 is greater than that of students taught by unqualified teachers 4.90. Therefore, students taught by qualified teachers achieved more than those taught by unqualified teachers.

Research Questions Three: What are the mean achievement scores of students taught by experience and less experience teachers?

Table 3: Mean and Standard Deviation of Academic Achievement of Students Taught by Experienced and Less-experienced Teachers

Levels trs experience	No of stdts	Scores obtained	Mean	Std. Deviation
Less experience	688	2,864	4.16	0.65
Experience	986	5,875	5.96	1.19

Table 3 depicted the mean and standard deviation of students taught by less experienced teachers 4.16 and 0.65 which is less than that of students taught by experienced teachers 5.96 and 1.19. This means then that students taught by experienced teachers achieved more than those taught by inexperienced teachers.

Research Questions four: What are the mean achievement scores of students in urban and rural schools?

Table 4: Mean and Standard Deviation on the Academic Achievement of Students in Urban and Rural Schools

Schools location	No of stdts	Scores obtained	Mean	Std. Deviation
Rural	1,068	5,597	5.24	1.79
Urban	606	2,982	4.92	1.36

From Table 4, the mean and standard deviation of academic achievement of students in rural schools 5.24 and 1.79 was greater than that in urban schools 4.92 and 1.36. Therefore, students from rural schools achieved more than those counterparts in urban schools.

Hypotheses Testing

Hypothesis One: There is no significant difference in the mean academic achievement of senior secondary school students taught in large and small classes.

Table 5: Independent t-test Analysis on Academic Achievement of Students Taught in Large and Small Classes

Class size	No. of stdt	Scores obtained	Mean	Std deviation	df	t-value	Sig (p)
Large	967	4, 456	4.61	1.96			
Small	707	3,867	5.50	1.38	1,672	3. 35	0.01155

From Table 5, the calculated t=3.35 with df =1,674 and p = 0.01155< 0.05. Since the value p= 0.01155 < 0.05 level of significance, the null hypothesis is rejected. This suggested that students taught in small class-size significantly achieved higher than their counterparts in large class-size classes.

Hypothesis Two: There is no significant difference in the mean academic achievement of senior secondary school students taught by qualified teachers and those taught by unqualified teachers.

Table 6: Analysis of Variance (ANOVA) of Academic Achievement of Students Taught by Qualified and Unqualified Teachers

	Sum of squares	Df	Mean square	F	Sig (P)
Between group	38.09	2	15.046	3.10	0.054
Within group	4,544.35	1,672	4.848		

Table 6 shows that the value of F(2, 1672) = 3.10 and the p- value is 0.054. Since the p-value 0.054 > 0.05, therefore, the null hypothesis is accepted. This suggests that there is no significant difference in the academic achievement of students taught by qualified teachers and those taught by unqualified teachers.

Hypothesis Three: There is no significant difference in the mean academic achievement of senior secondary school students taught by experienced teacher and those taught by less-experienced teachers.

Table 7: Independent t-test on Academic Achievement of Students Taught by Experienced and Less-experienced teachers

Trs experience	No of stdts	Scores obtained	Mean	Std. Deviation	df	t-val	P
Less experience	688	2,864	4.16	0.65168	1,672	**3.98**	0.00
Experience	986	5,875	5.96	1.19120			

Table 7 shows that the calculated t = 3.98 and the p = 0.00. Since p = 0.00 < 0.05, the null hypothesis is rejected. Therefore, there significant difference exists in the academic performance of students taught by experienced teachers and those taught by less-experienced teachers. These indicated that students taught by experienced teachers had significantly higher performance than those taught by less experienced teachers.

Hypothesis Four

There is no significant difference in the mean academic achievement of Senior Secondary School students in rural and urban areas.

Table 8: Independent t-test on academic performance of students from rural and urban areas

Locations	No of stdts	Scores obtained	Mean	Std. Deviation	df	t-cal	P
Rural	1,068	5,756	5.24	1.79	1,672	2.95	0.00
Urban	606	2,982	4.92	2.36			

Table 8 depicted calculated t-test 2.95, df=1,672 and p-value 0.00. Since p-value 0.00 is less than the 0.05 level of significance therefore, the null hypothesis is rejected. This suggests there is a significant difference in performance of students from rural schools and that from urban

schools. Student from rural schools performed significantly higher than the counterparts from urban schools.

Discussion of the Findings

The discussion of the findings was based on the result of analysis of research questions and hypotheses testing

The finding of hypothesis one and research question one on class size indicated students taught in small class-size had significantly achieved higher in mathematics mock examinations than their counterparts from large class-size classes. The results was consistent with Wosayanju (2005) who maintained that large class size poses some teaching challenges such as delayed feedback, resulting in inefficiency, poor quality of students, and reduction in teaching with less assignment so as to reduce the burden of marking all of which encourages shallow learning.

Hypothesis two tested for significant difference in the academic achievement of students taught by qualified teachers (M.Ed, B.Sc.Ed and NCE mathematics) and unqualified teachers (M.Sci, B.Sci and HND mathematics) in the state qualifying examinations in Senior Secondary Schools in Kokona LGA. The result of the test revealed that the academic achievement of students taught by qualified teachers was significantly higher than that of students taught by unqualified teachers. The findings was in line with Yusuf and Dada (2016) that discovered the mean performance score of students taught by professional teachers was higher than the mean performance score of students taught by non professional teachers.

The result of hypothesis three revealed that students taught by experienced teachers achieved higher than those taught by less-experienced. This finding is not consistent with Hanushek and Kain (2005), who contended that experience matters only in the first year of teaching. But the findings agreed with Yusuf and Dada (2016) which revealed the mean score of the students taught by teachers with teaching experience of between 6-15years was higher than that of students taught by teachers with teaching experience between 1-5years. The result is also consistent with the report of Olatunde (2009) whose study on influence of teachers' experience and students achievement revealed that students taught by more experienced teachers achieve higher level, because their teacher have master the content and acquired classroom management skills to deal with different classroom problems.

The result of hypothesis four revealed that students from rural schools performed better than students from urban schools in the state mock mathematics examination. This finding opposed the findings of Isiugo-Abanihe and Labo-Popoola (2004) which revealed that students in urban areas performed significantly better than those in rural areas and Alokan (2010) who showed that school location has significant effect on student academic performance in physics. Although, there were allegations of massive examination malpractices in the rural schools where teachers were alleged to have helped the students by supplying answers, there is no substantive report to that allegations.

Conclusion

Based on the findings of this study, the following conclusions are arrived at that academic achievement of students at the State mock Examination is significantly influenced by class sizes. Students in smaller classes achieved higher than their counterparts in the larger classes. Also professional qualifications of teachers significantly and positively influenced the academic achievement of students. The more qualified the teachers are the better the student' academic achievement. Again, teaching experience significantly influence academic achievement of students in mathematics mock Examination. Finally, Location of school has significant influence on the students' academic performance at the State mock Examination with the schools located in rural areas recording higher grades than their counterparts in the urban areas. Although, there were allegations of examination malpractices in the rural schools, however, the researcher did not have enough data to substantiate.

Recommendations

The following recommendations are made based on the outcome of the findings:

1. Schools should stick to the 40:1 student –teacher ratio as stipulated by the National Policy on education.
2. The government should mandate and motivate teaching professionalism in teachers and to stay in the teaching profession to gain adequate experience.
3. Government should monitor equal distribution of experienced teachers to schools located in both rural and urban areas.
4. Government should mandate and motivate teachers that are posted to schools in rural areas with allowances that will make them stay and perform their work diligently.

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