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# Influence of Teacher Characteristics On Academic Performance of Senior Secondary School Students in Mathematics in Three Geo-Political Zones of Nigeria

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**Abstract:**

This study investigated the influence of teachers' characteristic on the academic performance of senior secondary school students in Mathematics in three geo-political zones of Nigeria. The study examined the influence of teachers' qualification, experience and gender on the academic performance of students in Mathematics. It also examined the difference in the academic performance of students in Mathematics based on their geo-political zone. The research design adopted in the study was a descriptive design of the survey type was adopted in this study. The sample consisted of 562 S.S.S. 2 students (class intact size) drawn from eighteen public secondary schools in three geo-political zones of Nigeria namely South-East, North Central and South-West. Achievement Test in Mathematics (ATM) and inventory on teachers' characteristics were used to collect data. The data collected in this study were subjected to Analysis of Covariance, Analysis of Variance and Scheffe Post-hoc analysis at $\alpha = 0.05$ level of significance. The findings revealed that teacher characteristics such as their qualification, teaching experience and gender did not influence students' performance in Mathematics. It was also revealed that there was difference in students' performance in Mathematics based on their geo-political areas as students from South East geo-political performed significantly better than their counterparts in

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the South West and North Central. Based on the findings, it was recommended among others that teachers irrespective of their characteristics can make use of suitable strategy in teaching Mathematics.

**Keywords**: Teachers' characteristics, Academic performance, Senior Secondary Schools, and Mathematics,

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## Introduction:

Mathematics helps one to develop ability in creative thinking, seeing things with the inner eye and deep focusing. The importance of Mathematics to the society at large cannot be overemphasized because it is one of the essential subjects of modern technology. According to Kolawole and Popoola (2009) and Kolawole and Olofin (2018), Mathematics is an instrument that facilitates the learning of all subjects. No wonder Plato (a philosopher and mathematician) opined Mathematics is the bedrock of all other subjects and that is the reason why he said "let no man make destitute of mathematics". Due to the uniqueness of mathematics, it is classified as a compulsory subject right from the primary school to the secondary school and a subject that must be passed in the first school leaving certificate examination and Senior School Certificate Examination. Mathematics is one of the compulsory subjects both in the primary and secondary school level, not because the students are expected to become a mathematician but because of its application in day to day activities.

The performance of students keeps declining in Senior School Certificate Examination (SSCE) in mathematics. The performance of students in 2014, 2015 and 2016 SSCE in Mathematics as announced by West African Examination Council testified to this claim. WAEC recorded a mass failure in Mathematics in 2014, 2015 and 2016 where an average of more than 61% of the candidates who sat for the examination failed Mathematics (Premium Times Newspaper, 13th February, 2017). This unfortunate trend should agitate the minds of Mathematics educators in Nigeria.

The poor performance of students in Mathematics in Nigeria 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 teaching strategies, poor facilities, equipment and instructional materials for effective teaching, use of traditional chalk and talk methods, large pupils to teacher ratio and Mathematics phobia to mention but a few. The researcher is however interested in finding out if teachers' characteristics will have any influence on students' academic performance in Mathematics.

The success of any educational system depends greatly on teachers for the implementation of its programmes. Obadara (2005) stated that teachers are important for implementation of educational programmes which is a key to educational development. Teachers without relevant pedagogical skill cannot be used to facilitate students' academic achievement. Definitely, the outcome of any educational programme depends on the quality of teachers input into the system. If the teacher is unproductive, students under the teacher's tutelage may not be academically sound and such students could experience low academic achievement. This is regardless of individual differences in terms of individual potential in academic achievement.

The importance of teacher in a meaningful education at all levels is reflected in the National Policy on Education (2006) as it declares that no educational system may rise above the quality of its teachers. This declaration in the policy document underscores that teachers' characteristics can go a long way to determine the academic performance of students in Mathematics. It appears that the teaching strategy used by any teacher will not only

determine the academic performance of students but the characteristics of the teacher using such strategy will go a long way to determine the academic performance of students in Mathematics. For example, among the various characteristics of a teacher are: attitude, his qualification, years of experience, gender among others.

The problem of low academic achievement among the students in Mathematics has been plaguing our educational system completely right from the primary to the tertiary levels. The mass failure has been attributed to teachers' methodology, non-availability of teaching materials, poor communication skills and dearth of the knowledge of certain mathematical concepts such as Word problems, Equations involving calculations, Logical concepts among others. All of these appeared to have been investigated yet the problems seem to have remained persistent going by the recurring mass failure in Mathematics external examinations in the country.

However, since the teacher is the main implementer of the curriculum and controls what goes on in the classroom, this sorry state of affair on students' achievement in Mathematics cannot be tackled without investigation into teacher characteristics (qualification, experience and gender) with a view to proffering solutions. The teacher grips the axis upon which the world of education revolves. The problem of the study therefore, is to investigate the effects of teachers' characteristics such as qualification, experience and gender on the academic performance of senior secondary school students in Mathematics.

**Purpose of the Study**

The purpose of the study was to investigate the influence of teachers' characteristics on the academic performance of senior secondary school students in Mathematics in Nigeria. Specifically, the study examined:

i. the influence of teacher qualification on the academic performance of students in Mathematics;
ii. the influence of teacher teaching experience on the academic performance of students in Mathematics;
iii. the influence of teacher gender on the academic performance of students exposed in Mathematics; and
iv. the difference in the academic performance of students in Mathematics based on their geo-political zone.

**Hypotheses**

Based on the aforementioned questions the following hypotheses were generated

1) Teacher qualification has no significant influence on the academic performance of students in Mathematics.
2) Teacher teaching experience has no significant influence on the academic performance of students in Mathematics.
3) Teacher gender has no significant influence on the academic performance of students exposed in Mathematics.
4) There is no significant difference in the academic performance of students in Mathematics based on their geo-political zones

**Research Design**

The research design adopted for this study is a descriptive research of the survey type. The design was considered appropriate because this approach allows information to be obtained from a representative sample of the population in the actual situation as they exist.

**Population**

The targeted population for the study consisted of all the Senior Secondary School (S.S.S.) two students in public secondary schools in three geo-political zones of Nigeria namely South-East, North Central and South-West. The choice of Senior Secondary School (S.S.S.) 2 students was considered more appropriate because they had been exposed to some basic mathematical concepts.

**Sample and sampling techniques**

The sample consisted of 562 S.S.S. 2 students (intact class size), comprising of male and female students drawn from eighteen public secondary schools across the three geo-political zones of Nigeria, namely South-East, North Central and South-West. The sample was selected using multistage sampling procedure.

In stage one; a state was selected from each of the three geo-political zones of Nigeria namely South-East, South-South and South-West using simple random sampling technique. The next stage involved the selection of two Local Government areas from each of the three states through simple random sampling technique. In stage three, three public secondary schools were selected from each of the Local Government area through stratified random sampling technique. In stage four, the S.S.S. 2 class intact size of each of the eighteen schools were used for the study.

**Research Instrument**

A self-designed research instrument namely Achievement Test in Mathematics (ATM) and an Inventory on Teachers' Characteristics (ITC) were used to collect relevant data for this study. ATM was self-designed by the researcher and measured students' academic performance in Mathematics. It consisted of section A and B, section A sought for the bio-data of the respondents which include the name of the school, identification number, and geo-political zones. Section B of ATM consisted of 50 objectives items with five options made of thirteen questions on Knowledge, thirteen questions on Comprehension, seven questions on Application, seven questions on Analysis, five questions on Synthesis and five questions on Evaluation. Inventory on Teachers' Characteristics (ITC) only sought for information on teachers' qualification, gender and Mathematics teacher's teaching experience.

**Validity and reliability of the instrument**

The instrument was validated by face, content and criterion relative (concurrent) validity methods. It was given to three mathematics teachers teaching Senior Secondary Schools who were also team leaders in West Africa Examination Council (WAEC) marking exercise. The unified examination conducted by some states Ministry of Education was used as a criterion test to validate ATM. The validity coefficient obtained was 0.87. Fulon formula was used to establish the reliability coefficient of 0.85 for ATM.

**Administration of the Instruments**

The researcher took permission from school management of each sampled schools to administer the test. The four hypotheses were analyzed by Analysis of Covariance (ANCOVA), Analysis of Variance (ANCOVA) and Post-hoc Analysis (Scheffe) at α = 0.05 level of significance.

**RESULTS**

**Hypothesis 1:** Teacher qualification has no significant influence on the academic performance of students in Mathematics.

**Table 1:** Two-way Analysis of Variance (ANOVA) for influence of teacher qualification on academic performance of students exposed in Mathematics

| Source | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 4388.997[a] | 8 | 548.625 | 202.343* | .000 |
| Intercept | 71894.425 | 1 | 71894.425 | 26516.008* | .000 |
| Teachers' Qualification | .971 | 2 | .486 | .179 | .836 |
| Performance | 3841.885 | 2 | 1920.943 | 708.480* | .000 |
| Teacher Qualification * Performance | 16.264 | 4 | 4.066 | 1.500 | .202 |
| Error | 767.315 | 283 | 2.711 | | |
| **Total** | **154651.000** | **292** | | | |
| **Corrected Total** | **5156.312** | **291** | | | |

a. R Squared = .851 (Adjusted R Squared = .847) * P < 0.05

Table 1 shows that the F-cal value of 1.500 is not significant because the P value (0.202) > 0.05 at 0.05 level of significance. This implies that the null hypothesis is not rejected. Hence, teacher qualification has no significant influence on the academic performance of students in Mathematics.

**Hypothesis 2:** Teacher teaching experience has no significant influence on the academic performance of students in Mathematics.

**Table 2:** Two-way Analysis of Variance (ANOVA) for influence of teacher teaching experience on academic performance of students in Mathematics

| Source | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 4389.200[a] | 8 | 548.650 | 202.406 | .000 |
| Intercept | 80385.278 | 1 | 80385.278 | 29655.432 | .000 |
| Teachers' Experience | 1.192 | 2 | .596 | .220 | .803 |
| Performance | 4216.601 | 2 | 2108.301 | 777.786 | .000 |
| Teacher Experience * Performance | 10.610 | 4 | 2.652 | .979 | .420 |
| Error | 767.112 | 283 | 2.711 | | |

| | | | | | |
|---|---|---|---|---|---|
| **Total** | **154651.000** | **292** | | | |
| **Corrected Total** | **5156.312** | **291** | | | |

a. R Squared = .851 (Adjusted R Squared = .847) * P < 0.05

Table 18 shows that the F-cal value of 0.979 is not significant because the P value (0.420) > 0.05 at 0.05 level of significance. This implies that the null hypothesis is not rejected. Hence, teacher teaching experience has no significant influence on the academic performance of students in Mathematics

**Hypothesis 3:** Teacher gender has no significant influence on the academic performance of students exposed in Mathematics.

**Table 3:** Two-way Analysis of Variance (ANOVA) for influence of teacher gender on academic performance of students in Mathematics

| Source | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 4382.383[a] | 5 | 876.477 | 323.896* | .000 |
| Intercept | 77597.203 | 1 | 77597.203 | 28675.508* | .000 |
| Teachers' Gender | .479 | 1 | .479 | .177 | .674 |
| Performance | 4154.853 | 2 | 2077.426 | 767.699* | .000 |
| Teacher Gender * Performance | 8.200 | 2 | 4.100 | 1.515 | .222 |
| Error | 773.929 | 286 | 2.706 | | |
| **Total** | **154651.000** | **292** | | | |
| **Corrected Total** | **5156.312** | **291** | | | |

a. R Squared = .850 (Adjusted R Squared = .847) * P < 0.05

Table 3 shows that the F-cal value of 1.515 is not significant because the P value (0.222) is greater than 0.05 at 0.05 level of significance. This implies that the null hypothesis is not rejected. Hence, teacher gender has no significant influence on the academic performance of students in Mathematics.

**Hypothesis 4:** There is no significant difference in the academic performance of students in Mathematics based on their geo-political zone

**Table 4:** Analysis of Variance (ANOVA) for difference in academic performance of students in Mathematics based on their geo-political zone

| Groups | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 1681.047 | 2 | 840.523 | 85.512* | .000 |
| Within Groups | 2624.438 | 267 | 9.829 | | |
| **Total** | **4305.485** | **269** | | | |

* P < 0.05

The result presented in table 4 showed that F-cal value of 85.512 is significant because the P value (0.000) < 0.05 at 0.05 level of significance. Hence, the null hypothesis is rejected.

This implies that there is significant difference in the academic performance of students in Mathematics based on their geo-political zone. In order to investigate the source of the differences observed, Post – hoc analysis (Scheffe) with mean difference was carried out.

**Table 5:** Scheffe Post – hoc test and mean for observed difference in students' performance in the groups

| **Groups** | **Mean** | **South West** 36.52 | **South East** 38.26 | **North Central** 32.28 |
|---|---|---|---|---|
| **South West** | 36.52 | | | |
| **South East** | 38.26 | 1.7443* | | |
| **North Central** | 32.28 | 4.2342* | 5.9785* | |

* P < 0.05

In table 5, a significant difference was found between the performance of students in Mathematics in South West and South East in favour of students in South East. Also there was significant difference between the performance of students in Mathematics in South West and North Central in favour of students in South West. There was difference between the performance of students in Mathematics in South East and North Central in favour of students in South East.

The result of post – hoc test also showed that students in Mathematics in South East performed best. They performed significantly better than their counterparts in other South West and North Central. Moreso, South West performed better than those in North Central, which indicate that students performance in Mathematics in North Central performed worst.

**Discussion**

The finding of the study also showed that teacher qualification had no significant influence on the academic performance of students in Mathematics. By implication, qualification of the teachers has no influence on the academic performance of the students in Mathematics. This conforms to the finding of Anita (2013) who concluded that teachers' qualification does not influence students' academic performance. The finding negates that of Rowan (2007) and Thomas (2014) as they concluded that teacher qualification influences students' academic performance.

Another major finding of this study is that, teacher teaching experience has no significant influence on the academic performance of students in Mathematics. This result supports the finding of Zuelke (2008) who concluded that teachers' experience has no influence on students' academic performance while it contradicted the findings of Rice (2003) and Olaleye (2011) as they concluded that teacher experience has significant influence on students' academic performance

It is to be noted that teachers' gender had no significant influence on the academic performance of students in Mathematics. Gender of the teacher has no influence on the

academic performance of the students in Mathematics. This is in line with the submission of Akiri and Ugborugbo (2008) and Luschei (2011) who found out that teacher gender has no impact on students' academic performance. However, the finding contradicted the findings of Saha (2003), Thomas (2006), and Sparks (2013) who submitted that teacher gender has impact on students' academic performance.

The result further revealed that, there is significant difference in the academic performance of students in Mathematics based on their geo-political zone. A significant difference was found between the performance of students in Mathematics in South West and South East in favour of students in South East. Also there was significant difference between the performance of students in Mathematics in South West and North Central in favour of students in South West. There was difference between the performance of students in Mathematics in South East and North Central in favour of students in South East. The result of post – hoc test also showed that students in South East performed best. They performed significantly better than their counterparts in other South West and North Central. Moreso, students in South West performed better than those in North Central, which indicate that students in North Central performed worst.

**Conclusion**

Based on the findings of this study, it could be concluded that teacher characteristics such as their qualification, teaching experience and gender did not influenced students' performance in Mathematics. It was also concluded that there was difference in students' performance in Mathematics based on their geo-political areas as students from South East geo-political performed significantly better than their counterparts in the South West and North Central.

**Recommendations**

Based on the findings of this study, it was recommended that:

1) Teachers irrespective of their characteristics can make use of suitable strategy in teaching Mathematics.
2) Prospective researcher should embark on further studies to find out other variables that could influence students' performance in Mathematics

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