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# Influence of teachers' qualifications on academic performance of students in mathematics

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**ABSTRACT:** The study examined the effect of teachers' qualification on students' academic performance in mathematics. The study is vital as it portrays the extent to which students' performance are being influenced by the teachers qualification. In order to determine the relationship between students' academic performance in mathematics and teachers qualification, some of these key variables were used in the study, NCE, PDE/PGDE, B.Sc, B.Ed, M.Sc and M.Ed while students' performance was represented by their performance in mathematics. The research design used is survey design and data for the study were obtained from the teachers of the selected secondary schools in Idemili North Local Government in Anambra State teaching mathematics. The statistical test of parameter estimates was conducted using the Wilcoxon statistical test tool to establish the relationship between the variables. The findings generally indicated that a significant difference existed in the performance of students taught by professional teachers and non-professional teachers. On the basis of this finding, the study concluded that students who were taught by professional teachers perform much more than students who were taught by non-professional teachers in mathematics. The study therefore recommended that only qualified mathematics teachers should teach mathematics at the secondary school level. While the holders of Nigeria Certificate in Education (NCE) should be allowed to proceed in their education either through part-time or study leave likewise teachers without teaching qualification should pursue their Post Graduate Diploma in Education. As a result, their teaching method shall be improved upon in order to better the performance of students in mathematics.

**Keywords:** Academic performance, Mathematics, teachers' qualification.

## INTRODUCTION

The quality of education in a nation could be determined by the quality of her teachers. The most important factor in improving students' achievement in Mathematics is by employing seasoned qualified teachers in all schools (Abe and Adu, 2013). Bamidele and Adekola (2017) found that, policy investment on quality of teachers is related to improvement in students' performance. Specifically, the measurement of teacher's preparation and certification are correlates of students' achievement in science and mathematics. It is further reported that, teacher's characteristics such as certification status and degree in area of specialization are very significant and positively correlated with students learning outcomes in science and mathematics. This report was in line with the findings of Anyip (1988). The researchers opined that, a teaching qualification or teacher qualification is one of a number of academic and professional degree that enables a person to become a registered teacher in primary or secondary school. Such qualifications include, but are not limited to, the Post Graduate Diploma in Education (PGDE), the Professional Diploma in Education (PDE), Bachelor of Education (B.Ed), National Certificate in Education (NCE), and Masters in Education.

Academically qualified teachers refer to those who have academic training as a result of enrolment into educational institution and obtained qualifications such as HND, B.Sc, B.A, and M.A. and so on; while professionally qualified teachers are those who got professional training that gave

them professional knowledge, skills, techniques, aptitudes as different from general education (Akpo, 2012). They hold degrees like, B.Ed., B.Sc. Ed, B.A. Ed, and M.Ed and so on. On the other hand, there are studies that have found no significant relationship between teacher educational qualification and students' academic achievement. In Rivers State, teachers who are academically qualified and those that are professionally qualified are engaged to carry out instructional process (Ahiauzu and Princewell, 2011).

Ehrenberg & Brewer (1994) buttressed this by saying that teacher quality is the most important among other critical factors like quality curricula, funding, small class size and learning situation.

Jonah (2004) investigated the influence of teacher's qualification on academic performance of students in science subjects in Kano State. The researcher found no significant relationship between teacher's qualification and students' performance. Also, Adeniji (2004), Adaramola and Obomanu (2011) and Daniel et al. (2007) found out that teacher's qualification contributes minimally with variance to students' cognitive achievement. This was contrary to the observations of Adeogun (2001) who found that teacher's experience was highly significant on students' academic achievement in mathematics and physics. A lot of variables according to them may inhibit or hinder effective dissemination of knowledge to the understanding of the content by the students; such variables may be lack of qualified teachers, teachers' qualification, experience, and inadequate use of instructional materials among others which the present study sought to examine.

Moreover, a study done by Adaramola and Obomanu (2011) show that lack of qualified teachers led to consistent poor performance of students in Science and Mathematics (SMT) subjects. Also studies done by other scholars found that teachers' professional qualifications and teaching experience are not significantly related to students' academic achievement (Rivkin et al., 2005; Buddin and Zamarrow, 2009; Mbugua et al., 2012; Valentin et al., 2018).

Mixed and conflicting results however were noted on the effect of teachers' qualification on academic performance of students in mathematics. For instance, in the studies of Jonah (2004), Adeniji (2004), Adaramola and Obomanu (2011), Daniel et al. (2007), Adeogun (2001), Okonwa (2014) and many other studies, mixed results were observed and thus brought about too many arguments on the issue of teachers' qualification on academic performance of students in mathematics, so as a result, the study therefore becomes a necessity so as to bridge the gap in the literature.

As it can be seen from the aforementioned empirical evidences, there are inconclusive and inconsistent results with regard to the effect of teachers' qualification on academic performance of students in mathematics. However, from the literature reviewed, only few studies have been done on teachers' qualifications on students' optimal performance and more importantly, no study on teachers' qualifications had been conducted and emphasized particularly on secondary schools in Anambra State of Nigeria. This is another modest contribution to bridge the research gap in the literature and as well make suggestions based on the findings of the study on how these issues and arguments could be harnessed.

## Aims and objectives of the study

The aim of this study is to examine the influence of teachers' qualifications on academic performance of students in mathematics. Specifically, the objectives of the study were:

1. To ascertain the difference between the performance of students taught by teachers with National Certificate in Education (NCE) and those with PDE/PGDE certificate in Mathematics.
2. To examine the difference in the performance of students taught by B.Sc holders and B.Ed holders in Mathematics.
3. To determine the difference in the performance of students taught by M.Sc holders and M.Ed holders in Mathematics.

## Hypotheses

Based on the above research objectives, the following three hypotheses were formulated and consequently tested in order to achieve the purpose of the study:

**$H_{o1}$:** There is no significant difference in performance of students taught by National Certificate in Education (NCE) holders and PDE/PGDE holders in Mathematics.
**$H_{o2}$:** There is no significant difference in performance of students taught by Bachelor of Science in Education (B.Sc. Ed.) holders and Bachelor of Science (B.Sc.) holders in Mathematics.
**$H_{o3}$:** There is no significant difference in performance of students taught by M.Sc holders and M.Ed holders in mathematics.

## Research question

In order to direct the flow of this study, the following questions were raised:

1. Are students taught by teachers with NCE qualification performing better than those taught by teachers with PDE/PGDE qualifications?
2. Are students taught by teachers with B.Sc.Ed qualification performing better than those taught by teachers with B.Sc qualification?

3. Are students taught by teachers with M.Sc qualification performing better than those taught by teachers with M.Ed qualification?

## REVIEW OF THE RELATED LITERATURE

### Conceptual framework

#### *The concept of teachers' qualification*

Asikhia (2010), teacher qualifications can be divided into two categories. The categories are personal quality and certification. What qualify someone to teach and that can influence students' academic performance are related to certain qualities teacher got in the classroom and was certificated at a particular period of his or her lifetime. The second one is those related to personal qualities that are continuous in his or her lifetime. Degree certificates, formal education, and in-field preparation are not throughout the life of a teacher. When a teacher obtains these qualifications, it holds throughout his or her lifetime.

#### *The concept of academic performance*

In educational setting, success is measured by academic performance or how well a student meets standards set out by the institution. As career competition grows even more fierce in the working world, the importance of students doing well in school caught the attention of parents, legislators and government education departments alike (Aina and Olanipekun, 2015).

### Theoretical framework

This study was based on the theory of performance (TOP). The theory of performance (TOP) was propounded by Don Elger in the year 1962. The theory of performance develops and relates six foundational concepts to form a framework that can be used to explain performance as well as academic performance improvements in order to produce valued results. A *performer* can be an individual or a group of people engaging in a collaborative effort.

Developing performance is a journey, and *level of performance* describes location in the journey. Current level of performance depends holistically on six components: context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. Three axioms are proposed for effective performance improvements. These involve a *performer's mindset*, *immersion* in an enriching environment, and engagement in *reflective practice*.

According to the theory of performance, a teacher advances his levels of performance produces deeper levels of learning, improves levels of s kill development, and more connection with the discipline for larger classes while spending less time doing this. The theory purports that as an academic department improves its level of performance, the members of the department are able to produce more effective student learning, more effective research, and a more effective culture. Hence, the study is anchored on this theory.

### Empirical review

Jonah (2004) investigated the influence of teacher's qualification on academic performance of students in science subjects in Kano State. The researcher found no significant relationship between teacher's qualification and students' performance. Also, Adeniji (2004), Adaramola and Obomanu (2011) and Daniel et al. (2007) found out that teacher's qualification contributed minimally to the variance with students' cognitive achievement.

This was contrary to the observations of Adeogun (2001) and Okonwa (2014) who found that teacher's experience was highly significant on students' academic achievement in mathematics and physics. A lot of variables according to them may inhibit or hinder effective dissemination of knowledge to the understanding of the content by the students; such variables may be lack of qualified teachers, teachers' qualification, experience, and inadequate use of instructional materials among others which the present study sought to examine.

Moreover, a study done by Adaramola and Obomanu (2011) in Nigeria found that students taught by PGDE holders perform better than the students taught by NCE holders in Science and Mathematics Subjects (SMT). The study also noted that lack of qualified teachers led to consistent poor performance of students in SMT subjects.

Valentin et al. (2018) recognized mothers' strategies for children's school achievement. The investigator collected data from heterogeneous sample of mothers of eighth graders through interview schedule. The results also indicated that parents actively manage their children's school career in a way that could have direct consequences for their children's academic achievement. Mother's education levels were found to influence academic achievement of the students through parental involvement and parental encouragement.

Filgona et al. (2016) investigated academic achievement of primary school children via their teachers' qualifications. Data were collected from a sample of 100 boys from two English medium schools. Results indicated that the children whose teachers were highly educated had better performance in both school examinations and achievement tests than those children whose parents were less educated.

Ryckman and Rallo (1986) conducted a study on gender relationships among intellectual achievement, responsibility, questionnaire and measured achievement and grades. Data were collected from 145 girls and 142

boys of fourth to sixth grade students of California using California achievement test. The results revealed no significant gender differences in academic achievement of the students.

Bamidele and Adekola (2017) carried out a research to investigate the relationship between education of teachers' and academic achievement of students on a sample of 85 school students of semi-rural settings in Rajasthan. The results revealed that the children whose teachers' were educated performed higher in academics than the children whose teachers' were illiterate. Furthermore, the results indicated that teachers' education was significantly related to the academic achievement of the students.

Akpo (2012) investigated the relationship between teachers' education and academic achievement of 369 boys and 652 girls in South Africa. The marks obtained by the pupils in the class were aggregated as the criterion measure of academic achievement of the students. Findings revealed significant effect of teachers' education on academic achievement of their children.

Hasnor et al. (2013) investigated the relationship between some social-psychological variables and the academic achievement of students in Azad Kashmir. The sample comprised of 640 boys and 360 girls. Annual examination scores for three consecutive years were aggregated as measure of academic achievement of the students. The findings indicated a positive relationship between parents‟ education and academic achievement of their children. Girls were also found to have better academic achievement than boys.

Musau et al. (2013) conducted a study to compare the adjustment of the students having graduate and undergraduate parents on a sample consisted of 398 adolescents of South Eastern United States. The results revealed that youth from families in which neither parent was graduated showed significantly worse socio emotional and academic adjustment as compared to those youth who had graduate parents.

Rivkin et al. (2005) conducted a study on teachers' qualifications and academic achievement of elementary school children. The sample comprised of 212 students of middle schools of Bhopal. The results revealed a significant difference in academic achievement of boys and girls been dependent of teachers' qualifications.

Shreiber (2002) studied socio-psychological factors, which promote students' mathematics competence among urban and tribal students. The sample comprised of 194 urban and 132 tribal students selected randomly for the study. Data was collected by administering mathematics achievement test developed by national council of educational research and training from the sample. The findings revealed that mathematics competence of urban students had positive and significant relationship with fathers' education. Urban students whose fathers had higher educational status performed better in mathematics.

Adeniji (2002) conducted a study on neuroticism, extraversion and academic achievement as related to gender and culture. The sample selected for the study was 400 students of eighth class belonging to urban and rural area of Punjab. School records and Eysenck's personality inventory was used for data collection. Results revealed a significant difference between boys and girls of rural areas on academic achievement.

Javid (2015) conducted a study on family factors which potentially put parental involvement at risk. The participants in the study were parents, teachers and 350 children of America. Family and social data were collected through interviews conducted with parents. Parental involvement was rated by teachers and parents separately using a purpose designed instrument. Highly educated parents encouraged their children more to achieve. Findings also indicated positive relationship between academic achievement and parental education.

Devi and Kiran (2012) studied factors associated with scholastic backwardness of secondary school children. 100 low achievers from secondary schools of Hyderabad city were selected as sample for the study. Interview schedule was used to elicit factors related to scholastic backwardness. The results reported that low educational status of parents found to be detrimental to academic achievement of their children.

Deary et al. (2004) conducted a longitudinal study to examine the association between psychometric intelligence and educational achievement. The sample comprising of 70,000 school students of England participated in the study. Academic achievement was taken as the scores obtained by students in national public examination. The results showed gender difference in academic achievement. The findings indicated that the girls performed better than the boys.

Firmender et al. (2014) studied academic learning environment of students from aided and unaided co-educational high schools. Data were collected from administering home learning environment scale developed by the researcher and academic achievement was taken as average percentage marks of the previous year and two semesters of the current year of the students. The results revealed no significant different in academic achievement of boys and girls. Teachers' education was also found to have significant and positive relationship with academic achievements of the students.

Bruni and Evers (2016) explored the relationships among academic achievement, demographic and psychological factors. On the sample of 380 school students of Italy, school achievement index was used as an instrument to measure their academic achievement. The findings of the study indicated significant difference in academic achievement of male and female students. Female students were found to have higher academic achievement than males.

Cohen et al. (1999) examined the effect of motivation, family environment, and student characteristics on academic achievement. On the sample comprised of 388

high school students including 193 male and 195 female students of Abu Dhabi district in United Arab Emirates. Grade point average was taken as measure of academic achievement of the students. The results revealed no significant gender difference in academic achievement of the students.

Igwe (1990) analyzed the relationship between depressive symptoms, academic achievement and intelligence. The data were collected from the sample of 635 school children consisting 304 boys and 331 girls by using Wechsler's intelligence scale for children and grade point average. The findings indicated that there was no gender difference in academic achievement of boys and girls.

Asthana (2011) conducted a study on a sample of 300 students consisting 150 male and 150 female students of secondary education from Varanasi, with a view to assess to gender difference in scholastic achievement. Scholastic achievement was measured on the basis of an average of marks obtained in three previous annual examinations. The findings revealed that there was a significant difference in academic achievement of male and female students. Girls were found to be better performers than boys.

## METHODOLOGY

Purposive sampling of 60 students were selected from the 6 government secondary schools purposively selected from 22 government secondary schools in Idemili North Local Government Area of Anambra state with emphasis on academic performance of students via teachers' qualifications.

The choice of the 6 selected secondary schools in Idemili North Local Government Metropolis lies on the outcome and responses received via the Teachers Assessment Form (TAF) distributed to the teachers of the 22 secondary schools in Idemili North Local Government Area, teaching Mathematics. The Teachers Assessment Form (TAF) distributed enabled the researcher to determine the teachers' qualifications needed for the study.

Test-retest technique was used to ensure the reliability and consistency of the results. The Test-retest technique was carried out by re-issuing same copies of questionnaire to the respondents in order to determine if similar findings shall be made. However same result was established.

For the test of validity of the instruments for the data collection, it was subjected to test of validity by experts from Nwafor Orizu College of Education, Nsugbe so as to ensure accuracy and appropriateness of the source of data used.

Data generated for the study were collated and analyzed using Wilcoxon operated with SPSS version 20. Thus helped to describe the effect of explanatory variable (NCE, PDE/PGDE, M.Sc, M.Ed, B.Sc and B.Ed) on dependent variable (students' academic performance).

## RESULTS AND DISCUSSION

Wilcoxon statistical test tool was explored to test the linear relationship between the dependent and independent variable using SPSS version 20 as shown in the Tables 1 to 3. The results of the study were discussed based on the three hypotheses as given below:

### $Ho_1$: There is no significant difference in performance of students taught by National Certificate in Education (NCE) holders and PDE/PGDE holders in Mathematics

In view of the above analysis as shown on Table 1, the result shows that there is a significant difference in performance of students taught by National Certificate in Education (NCE) holders and PDE/PGDE holders in Mathematics. The Wilcoxon test has a p-value of 0.004. This probability value is statistically significant at 5% level. Also, since the p-value is less than 5%, the null hypothesis was rejected as suggested by the decision rule shown in Table 1 and alternate hypothesis accepted which contends that there is a significant difference in performance of students taught by National Certificate in Education (NCE) holders and PDE/PGDE holders in Mathematics.

This observation is in tandem with the apriori expectations of Adaramola and Obomanu (2011) and Bamidele and Adekola (2017) who found that students taught by PGDE holders perform better than the students taught by NCE holders in Science and Mathematics (SM) subjects. The study also notes that lack of qualified teachers led to consistent poor performance of students in SMT subjects.

### $H_{o2}$: There is no significant difference in performance of students taught by Bachelor of Science in Education (B.Sc. Ed.) holders and Bachelor of Science (B.Sc.) holders in Mathematics

In view of the above analysis as shown on Table 2, the result shows that there is a significant difference in performance of students taught by Bachelor of Science in Education (B.Sc. Ed.) holders and Bachelor of Science (B.Sc.) holders in Mathematics. The Wilcoxon test has a p-value of 0.017. This probability value is statistically significant at 5% level. Also, since the p-value is less than 5%, the null hypothesis was rejected as suggested by the decision rule shown on Table 2 and alternate hypothesis accepted which portends that there is a significant difference in performance of students taught by Bachelor of Science in Education (B.Sc. Ed.) holders and Bachelor of Science (B.Sc.) holders in Mathematics.

This is in consonance with the findings of Sharma (2014) and Hasnor et al. (2013) who noted that students taught by B.Ed holders perform better than the students taught by

**Table 1**. Result on performance of students taught by national certificate in education (nce) holders and pde/pgde holders in mathematics.

| Null hypothesis | Test | Sig. | Decision |
|---|---|---|---|
| The median of differences between performance of students taught by nce holder in mathematics and performance of students taught by pde/ pgde holder in mathematics equals o. | Related – samples wilcoxon signed rank test | 0.004 | Reject the null hypothesis |

Asymptotic significances are displayed. The significance level is 0.05.

**Table 2.** Result on performance of students taught by B.Ed holder and B.Sc holder in Mathematics.

| Null hypothesis | Test | Sig. | Decision |
|---|---|---|---|
| The median of differences between Performance of students taught by B.Ed holder in Mathematics and Performance of students taught by B.Sc holder in Mathematics equals O. | Related – Samples Wilcoxon Signed Rank Test | 0.017 | Reject the null hypothesis |

Asymptotic significances are displayed. The significance level is 0.05.

**Table 3.** Result on performance of students taught by M.Ed holder and M.Sc holder in Mathematics.

| Null hypothesis | Test | Sig. | Decision |
|---|---|---|---|
| The median of differences between Performance of students taught by M.Sc holder in Mathematics and Performance of students taught by M.Ed holder in Mathematics equals O. | Related – Samples Wilcoxon Signed Rank Test | 0.017 | Reject the null hypothesis |

Asymptotic significances are displayed. The significance level is 0.05.

B.Sc holders. Thus, the study revealed that teachers' education was positively and significantly associated with academic achievement of their children.

***$H_{o3}$:*** *There is no significant difference in performance of students taught by M.Sc holders and M.Ed holders in Mathematics.* In view of the above analysis as shown on Table 3, the result shows that there is a significant difference in performance of students taught by M.Sc holders and M.Ed holders in mathematics. The Wilcoxon test has a p-value of 0.017. This probability value is statistically significant at 5% level. Also, since the p-value is less than 5%, the null hypothesis was rejected as suggested by the decision rule shown on Table 3 and alternate hypothesis is accepted which contends that there is a significant difference in performance of students taught by M.Sc holders and M.Ed holders in Mathematics.

This agrees with the findings of Bamidele and Adekola (2017) who found that teachers who hold M.Ed taught students better in Science and Mathematics (SMT) than those with M.Sc. Sequel to this, the study concludes that teachers' education was a significant predictor of educational achievement.

## Conclusion

This study having empirically examined the influence of teachers' qualifications on academic performance of students, concludes that;

1. students taught by PDE/PGDE holders perform better than the students taught by NCE holders in Mathematics.
2. the performance of students taught by B.Ed holders in Mathematics has a higher proportion than the performance of students taught by B.Sc holders in Mathematics.
3. students taught by M.Ed holders perform better than the students taught by M.Ed holders in Mathematics.

## Recommendations

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

1. Since students taught by PGDE/PDE holders perform better than students taught by NCE holders in Mathematics, the study recommended that teachers with NCE should strive to improve their knowledge in Mathematics by acquiring additional qualification through in-service training or part-time or sandwich degree programme in the universities around their place of working.
2. Graduate teachers (HND holders, B.Sc holders etc) without teaching qualification should endeavour to proceed on PGDE or PDE programme in addition to their first degree to enhance their teaching method in Mathematics in secondary schools level.

3. The holders of M.Sc are also suggested to enroll in PGDE or M.Ed so as to improve on their teaching methods since teachers' education is a significant predictor of educational achievement.

## CONFLICT OF INTEREST

Authors declare that they have no conflict of interest.

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