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The Effects Of Qualified Mathematics Teachers On The Performance Of Secondary School Students In Udu Local Government Area, Delta State

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ABSTRACT
This research work investigated the effects of the qualification of mathematics teachers on the academic performance of secondary school students in mathematics. The sample of the study consisted of one hundred students who were selected randomly, ten secondary school mathematics teachers and five heads of schools/administrators selected purposively from five secondary schools which were also purposively selected from all the secondary schools in Udu Local Government Area, Delta State. The ex-post facto design was used. Two instruments: the Mathematics Teachers and Heads of Schools/Administrators Questionnaire (MATHSAQ) and the Students' Mathematics Achievement Test and Questionnaire (SMATQ) were constructed by the researcher and used to collate data. Experts in mathematics and education validated the instruments. The reliability of the study using test-retest method was 0.87. Three specific research purposes and three research questions were formulated to guide the study. Three research hypotheses were made and tested using the Chi-Square (X^2) test statistic at a 0.05 level of significance. The results indicated that significant difference existed in the performance of students taught by professionally qualified teachers and non-professionally qualified teachers. Based on this finding, the study recommended that all teachers should acquire professional qualification and experience in education in addition to their academic qualification. This may improve teaching effectiveness and consequently the performance of students in mathematics.
Keywords: teachers' qualification, mathematics, students, teaching methods

INTRODUCTION

In a world with ever increasing knowledge and an abundance of information, individuals need to be given proper guidance to make meaningful use of available knowledge and information to bring about benefits and progress to all mankind. Mathematics, being the bedrock of science and technology, is one facet of human knowledge in which students need good foundational knowledge. Globally, mathematics is regarded as one of the most important subjects in the school curriculum (Suleiman & Hammed, 2019). It is the foundation of scientific and technological knowledge that contributes significantly toward the socioeconomic development of a nation (Kiwanuka et al. 2015; Enu et al, 2015; Kafata & Mbetwa, 2016; Suleiman & Hammed, 2019).

Despite the importance of mathematics, however, there are a number of observable problems associated with the teaching and learning of mathematics especially at the secondary school level. There has been a noticeable deterioration in students' achievement and interest in mathematics. Several factors such as

attitude of students and teachers, study habit, teachers' qualification, teaching methods, school environment and management, government policy, school location and cultural background have been identified in several studies as factors influencing students' academic achievement (Asikhia, 2014; Akomolafe & Olaranfemi - Olabisi, 2011).

Over the past decades, educational planners, policy makers, and administrators all over the world have become increasingly concerned about the quality of education provided by the school system. Abe &Adu (2013) stated that the most important factor in improving students' achievement in mathematics is by employing seasoned qualified teachers in all schools. However, the availability of professional teachers in our schools is low (Adeniji&Ogunyemi 2023). Reasons being that teaching is seen as a job to be taken on temporarily irrespective of one's area of specialization and treated as a bypass venture to one's desired end.

Although there is an ongoing debate as to whether teachers' qualification accurately identify teachers' effectiveness in improving students achievement, recent research has found statistically significant relationships between these variables. Consider some of these performance of students and no matter how well developed and comprehensive a curriculum is, its success is dependent on the quality of the teachers implementing it. The study of Elizabeth (2018) shows that the independent variables; teachers' academic qualification, experience, and teacher-student relationship made significant contribution to students' interest and achievement in mathematics.

A study by Tshabalala & Ncube (2016) stressed that mathematics is the bedrock and a tool for the scientific, technological, and economic advancement of any country. It is a common belief of educationists that no one can make progress in any field without having the basic knowledge of mathematics (Visser et al, 2015). According to (Suleiman & Hammed, 2019; Karakolidis et al, 2016), mathematics is the foundation of science and technology without which a nation will not prosper and achieve economic independence. That is why mathematics is one of the leading core subjects in the secondary schools' curriculum. For example Abe (2014) conducted a study on effect of teachers' qualification on student achievement in mathematics. It was revealed that there was a significant difference between the performance of student taught by teacher with high qualification and student taught by teacher with low qualification

Although, a review of the research works reveal missing links, imbalances or unresolved issues that this study attempts to cover. An in-depth investigation on these issues identified was required for this study to provide enlightenment into the effects of the qualification of mathematics teachers on students' performance in mathematics. This study also considers the influence of objective measures of teacher quality such as teaching experience, teaching methods, and relations with students on students' performance in mathematics.

Statement of the Problem

In Udu Local Government Area, Delta State, the academic trajectory of secondary school students in mathematics is confronted by a pervasive challenge: the variable quality of mathematics teachers. The dearth of qualified mathematics educators potentially jeopardizes the educational foundation of these students, hindering their academic performance and overall cognitive development. This research delves into the critical examination of the far-reaching implications of this issue, seeking to uncover the extent to which the proficiency and qualification of mathematics teachers impact the learning outcomes of secondary school students in the region. The quest to understand and address this substantial problem is not merely an intellectual pursuit but a commitment to the educational well-being of the students in the region. Through this study, the researcher aspires to influence positive changes in the local education landscape, fostering an environment that nurtures academic excellence in mathematics and contributes to the broader development of the students in Udu Local Government Area, Delta State.

Objective of the Study

The main purpose of this study is to probe the effect of qualification of mathematics teachers on the performance of secondary school students in Udu Local Government Area, Delta State. Specifically the objectives of this study are;

i. To assess the influence of the professional qualification and experience of mathematics teachers on students' performance in mathematics.
ii. To examine the effects of the major teaching methods on students' performance in mathematics.
iii. To determine the nature of teacher-student relationship and its effect on students' performance in mathematics.

Research Questions

The following research questions raised to guide the study:

1. What is the difference in the performance of students taught by experienced, academically and professionally qualified teachers and minimally experienced, academically, but non-professionally qualified teachers?
2. What is the relationship between the major teaching methods (Teacher-centred and Learner-Centered methods) and students' performance in mathematics?
3. Is there a relationship between good teacher-student relationship and students' performance in mathematics?

Research Hypotheses

The following null hypotheses were formulated and tested with 0.005 level of significance.

$H_0$1: There is no significant difference in the performance of students taught by experienced, academically and professionally qualified teachers and minimally experienced, academically but non-professionally qualified mathematics teachers.

$H_0$2: There is no significant relationship between the application of the major teaching methods (teacher-centered and learner-centered methods) and students' performance in mathematics.

$H_0$3: There is no significant relationship between good teacher-student relationship and students' performance in mathematics.

REVIEW OF RELATED LITERATURE

Concept of Academic Performance

Academic performance basically connotes a student's attainment in a learning situation. The academic performance of a student may be high, average, good, poor or low. The term academic performance has been described as the scholastic standing of a student at a given moment. It refers to how a student is able to demonstrate his/her intellectual abilities. This scholastic standing could be explained as the grades obtained in a subject or groups of subjects taken (Daniel & Schouten, 2016; Owoyemi, 2014).

Simkins (2017) commented on the scholastic standing of students and their performance to be a measure of output and that the main outputs in education are expressed in terms of learning. By learning, Simkins (2017) implies changes in knowledge, skills and attitudes of individuals as a result of their experiences within the school system

Teaching Methods

Empiricism, as postulated by John Locke, is an epistemological position which contends that genuine knowledge is what comes to us through our sensory experiences. This means that the only sources of genuine knowledge are senses of light, sound, touch, smell and taste (Isack, 2015). This implies that teaching methods in mathematics need to involve the five senses of the human body in order to inculcate mathematical knowledge indelibly in the minds of students. The major teaching method that readily comes to mind to help achieve this is the learner-centered teaching method.

Objectivists like Rand Ayn believe knowledge exists outside the individual. Objectivists' instruction tends to be directive and linear, valuing inductive logic, often leveraging objective assessment (cmich.Edu, 2019). This theory highlights the role played by a facilitator of knowledge, one with the experience and knowledge. This theory portrays the teacher-centered method of teaching. However, as Danmole& Femi-Adeoye (2014) opine, "no single method is best for the teaching of mathematics. Teaching styles that would permit students' active participation such as field work, use of laboratory, group work, concept mapping, inquiry methods and appropriate control and coordination of students should be used. These methods are most likely to ensure higher performance and promote students interest in mathematics.

In fact, several studies have attributed poor academic achievement of students to the deficiency in teaching method(s) used by mathematics teachers (Suleiman & Hammed, 2019; Kafata&Mbetwa, 2016; Enu et al, 2015).

Quality, Performance, and Qualification of Mathematics Teachers

Moreover, great teachers are quality and better performing teachers who tend to inspire people around regardless of any challenges or barriers. Quality, performance, and qualification of mathematics teachers are other important factors that significantly influence the attitude and achievement of mathematics students. Lal (2016) observed through research that the achievement of students is strongly linked to high-quality and qualified teachers. A recent study by Suleiman Y, & Hammed A. (2019). revealed that the majority of the students indicated that their teachers did not have enough potential to teach mathematics. Most of the mathematics teachers do not make the teaching of mathematics practical and exciting due to inadequate training at HE institutions or lack of training for pre-service teachers on the 21st-century pedagogies in mathematics, which ultimately leads to negative attitude and poor achievement in mathematics among students. It is, therefore, important that both pre-service and in-service training are essential for the quality professional development of the teacher (Enu et al, 2015). Study by Sharma et al (2018) have emphasized that technology is essential in teaching and learning mathematics.

Qualification/Experience of Mathematics Teachers on Students' Performance in Mathematics

In their opinion, Abe and Abu (2013) and Wiki (2013) mention that teaching 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; Postgraduate Diploma in Education (PGDE), Higher National Diploma (HND), Professional Diploma in Education (PDE), Bachelor of Science (B.Sc.), Bachelor of Education (B. Ed.), Bachelor of Arts (B.A), Nigeria Certificate in Education (NCE), Ordinary National Diplomas (OND).

Abe (2014) examined the effects of teacher's qualifications on students' performance in mathematics. Three hundred students were randomly selected from ten schools that were purposively selected from sixteen secondary schools in Ikere Local Government Area, Ekiti State and were used as sample for the study. The qualification of the teachers was used as the criteria for selection of mathematics teachers. The results show that a significant difference exists in the performance of students taught by professional and non-professional teachers; between students taught by NCE teachers and B.Sc.(Ed) teachers and also between B.Sc. teachers and B.Sc.(Ed) teachers. The study recommends that only qualified mathematics teachers should be allowed to teach mathematics at the secondary school level.

The research by Umar, et al (2013) examined the effects of teacher's qualifications on performance in further mathematics among secondary school students in Kaduna State. By purposive sampling, twelve senior secondary schools were selected from four inspectorate divisions in the state. A sample of one hundred and sixty further mathematics students were 30 randomly selected across the four divisions. Two instruments; Teacher Self- Assessment Test and a 30-item four option multiple choice Further Mathematics Achievement Test were administered. The analysis of variance revealed that significant difference exists between students' performance on account of their teachers' qualifications.

Surprisingly, the research by Ebenezer, et al (2015) yields a different result. The study investigated the relationship between the quality of teachers and students' academic performance in Sekondi Takoradi Metropolitan Assembly (STMA) Junior High Schools in Ghana. Descriptive Survey design was used and the target population was Junior High School teachers and pupils in the metropolis. Five educational circuits in the metropolis were randomly selected for the conduct of the study. Stratified and systematic sampling techniques were used to sample participants and the sample size was five hundred. Questionnaire was the main instrument used for data collection. The results of the study showed that even though the quality of teachers was high in terms of their academic and professional qualifications, it did not reflect much in the performance of the students.

Owolabi and Adebayo (2012) also studied the effects of teachers' qualification on the performance of Senior Secondary School Students. Though, the study was in the area of physics. The survey type of descriptive research design was adopted. The sample for the study consisted of one hundred senior secondary school physics students and teachers who prepared and presented the students in each school

for 2009/2010 WASSCE. The results revealed that students taught by teachers with higher qualifications performed better than those taught by teachers with lower qualifications. It also showed the experience of the teacher is significant in impacting the students' academic performance in Physics. Based on the findings, it was recommended that experienced teachers with professional qualification in higher level should teach physics at the certificate class.

RESEARCH METHODS

This study employed the ex-post facto research design. The population of the study comprised of all Junior Secondary School Students, mathematics teachers in Secondary Schools, and heads of schools/ administrators of secondary schools in Udu Local Government Area, Delta State. A sample of 100 students, 10 mathematics teachers and 5 heads of schools/administrators were randomly selected from 5 secondary schools. The 5 secondary schools were purposively selected from all the secondary schools in Udu Local Government Area, Delta State. In each of the 5 schools, 20 Junior Secondary School Students were selected by simple random sampling technique, 2 secondary school mathematics teachers and 1 head of school/administrator were purposively selected. The research instruments for data collection were the Mathematics Teachers and Heads of Schools/Administrators Questionnaire (MATHSAQ) and Students' Mathematics Achievement Test and Questionnaire (SMATQ).

The MATHSAQ consists of 4 sections. The first section, section A, contains the demographic profile of teachers and heads of schools/administrators. Section B consists of 6 items that elicit information on teachers' applied teaching methods. Section C contains 16 items that reveal the status of teacher student relationship between mathematics teachers and their students. Section D, to be completed by heads of schools/administrators only, consists of 9 items that measures the professional qualification of the respondent. The MATHSAQ follows a 5 point-likert scale structure. The SMATQ consists of 3 sections. Section A contains the mathematics achievement test questions which are objective in nature. These questions designed for Junior Secondary School Students are selected from past Junior Secondary Certificate Examination (JSCE) questions. This section contains 20 items. Section B consisting of 7 items elicits students response on their view of the mathematics teacher's teaching technique. Section C contains 15 items that seek students' opinion of their relationship with their teacher. The SMATQ uses a 4 point rating scale.

To test for reliability, the test-retest method was applied. Copies of the MATHSAQ and SMATQ were given to 40% of the same respondents at a later time with an interval of 3 weeks. Data collected were correlated using Pearson Product Moment Correlation (r) and the reliability of 0.87 was obtained. The data was obtained by means of the structured questionnaire and test. The schools surveyed were visited by the researcher. 115 copies of the questionnaire were administered and collected immediately after the respondents had filled in their responses. This showed a 100% return rate. In analyzing the data collected from the field, the research questions were analyzed using percentages while the chi-square (X^2) test was used to test the hypothesis.

RESULT AND DISCUSSION

The educational qualifications as presented in table 1.1 shows that 46.67% of the teacher participants have academic qualifications in their respective disciples but with no professional training in the field of education or teaching. 53.33% acquired professional training / qualifications in the field of education / teaching in addition to their academic qualification in their discipline. Of the 53.33% only 20% are classroom teachers. The remaining 33.33% are heads of schools / administrators. Additionally, 40% have 5 years or less teaching experience, 30% have a teaching experience of 6-20 years, and 40% have been in the teaching profession for over 20 years. The majority of the latter percentage are heads of schools/administrators, precisely 33.33% of the 40%.

Table 1.1: Demographic Profile of Teachers

Educational Qualification	**Frequency**	**Percent (%)**
Degree / Masters in Education	6	40
Certificate / Diploma in Education	2	13.33
Degree / Masters in Pure Sciences	7	46.67
Certificate / Diploma in Pure Sciences	-	-
Total	15	100

Teaching Experience	**Frequency**	**Percent (%)**
Below 5 years	6	40
6-20 years	3	20
20 years & above	6	40
Total	15	100

Analysis of Research Questions and Testing of Research Hypotheses

Research Question 1 :*What is the difference in the performance of students taught by experienced, professionally qualified teachers and minimally experienced, non- professionally qualified teachers?*

Table 1.2: Teacher Qualification and Students' Performance

	Performance		
Qualification	**No of passes**	**No of fails**	Total
professionally qualified	18	13	31
Non-professionally qualified	20	49	69
Total	38	62	100

Data drawn from the field, as presented in table2.1 showed that 18% of students taught by professionally qualified mathematics teachers passed while 13% failed. On the other hand, 20% of the students taught by non- professionally qualified mathematics teachers passed while 49% failed.

Research Hypothesis 1, $H_0$1

There is no significant difference in the performance of students taught by experienced, professionally qualified teachers and minimally experienced, non- professionally qualified teachers.

Table 1.3 Chi-Square Analysis on the Effect of Mathematics Teachers Qualification on Students' Performance.

	Performance							
Qualification	No. of Passes	No. of Fails	Total	Chi-Value (X^2)		Df	Level of Significance	Decision
Professionally Qualified	18	13	31	X caL.	X table			
Non-Professionally Qualified	20	49	69	7.82	3.84	1	0.05	Rejected
Total	38	62	100					

The Chi-Square analysis in table 1.3 reveals that the calculated chi-value, 7.82, is greater than the table value of 3.84 at degree of freedom 1 and 0.05 level of significance. Thus, the null hypothesis is rejected. This statistic shows that there is significant difference in the performance of students taught by experienced professionally qualified teachers and minimally experienced non-professionally qualified teachers.

Research Question 2: *What is the relationship between the major teaching methods (teacher-centered and learner-centered teaching methods) and students' performance in mathematics?*

Table 2.1: Teachers' Responses on Teaching Methods in Mathematics

Teaching methods	**Number**	**Percentages (%)**
Teacher centered	7	46.67
Learned centered	5	33.33
Others	3	20
Total	15	100

Results from the table implied that 46.67% of teacher participates believe that teacher-centered approach is most suitable in teaching mathematics. 33.33% preferred to apply the learner-centered method of instruction in the classroom. A unique 20% explicitly stated preference in applying both methods as it best suits the topic to be taught.

Research Hypothesis 2, $H_0$2: There is no significant relationship between the major teaching methods (teacher-centered and learner-centered methods) and students' performance in mathematics.

Table 2.2: Chi-Square Test on the Effect of Teaching Methods on Students' Performance in Mathematics

	Performance							
Teaching Method	No. of Passes	No. of Fails	Total	Chi-Value (X^2)		Df	Level of Significance	Decision
Teacher Centred	13	37	50	X caL.	X Table			
Learner Centred	18	22	40	8.23	5.99	2	0.05	Rejected
Other	7	3	10					
Total	38	62	100					

The Chi-square test in table 4.2.4 shows that the calculated chi-square, 8.23 is greater than the table value of 5.99 at degree of freedom 2 and 0.05 level of significance. Thus, the null hypothesis is rejected. This proves that there is significant relationship between the major teaching methods and students' performance in mathematics.

Research Question 3: *Is there a relationship between good teacher-student relationship and students' performance in mathematics?*

Table 3.1 Relationship between Teachers and Students

	Students' response		
Teachers' response	Good	Poor	Total
Good	21	9	30
Poor	29	41	70
Total	50	50	100

The above data shows that 21% of the student participants agreed with then- teachers to share good teacher-student relationship while 9% disagreed. 29% of the student participants showed by their response that they share good teacher-student relations with their teachers whose responses implied otherwise while 41% confirmed that the teacher-student relationship shared is poor as those teachers responses had insinuated. In total, 33.9% shared a good teacher-student relationship while 66.1% shared a poor teacher-student relationship.

Research Hypothesis 3, $H_0$3

There is no significant relationship between teacher-student relationship and students' performance in mathematics.

Table 3.2: Chi-Square Analysis on the Effects of Teacher-Student relationship on Students' Performance

Teachers Response	No. of Passes	No. of Fails	Total	Chi-Value (X^2)		Df	Level of Significance	Decision
Good	21	9	30	X caL.	X table			
Poor	29	41	70	6.86	3.84	1	0.05	Rejected
Total	50	50	100					

Chi-square analysis shows that the calculated chi-value, 6.86, is significantly greater than the table value of 3.84 at degree of freedom 1 and level of significance. Therefore, the null hypothesis is rejected.This reveals that there is significant relationship between good teacher student relationship and students' performance in mathematics.

DISCUSSION OF FINDINGS

The first research question and hypothesis reveals that the professional qualification of mathematics teachers is one of the chief determinants of students' academic performance in secondary schools. The results from the students' mathematics achievement test and questionnaire (SMATQ) shows that students taught by professionally trained teachers succeeded in their academics more than those who were taught by non-professionally trained and less experienced teachers. This confirms the work byAbe (2014) who conducted a study on effect of teachers' qualification on student achievement in mathematics. It was revealed that there was a significant difference between the performance of student taught by teacher with high qualification and student taught by teacher with low qualification

The second research question and hypothesis proves that application of a variety of instructional strategies, but especially the learner-centered approach in order to provide for the diversity of learners' is most effective. The results from the students' mathematics achievement test and questionnaire(SMATQ) shows that teacher participants who preferred using a variety of different types of methods that shifts the role of the teacher or instructor from givers of information to facilitating students' learning recorded more success. This study also revealed that while learner-centered method is mostly encouraged, applying teacher-centered approach in appropriate occasions contributes to effective teaching and learning. Data from the mathematics teachers and heads of schools/administrators questionnaire (MATHSAQ) also indicates that most of the teacher participants who applied the learner-centered method of teaching are those with professional qualification in the field of education. This emphasizes the essence of professional training for effective teaching of mathematics, in addition to academic training. While academic qualifications equip one with the knowledge of the subject matter, professional training equips the teacher with the knowledge of how best to present information or knowledge to students for effective learning to take place. Hence, teaching methods significantly influence students' academic achievements. This is also in line with the study conducted by Ayodeji & Morenikeji (2020) in their study revealed that Teachers' teaching method is the most influential factor affecting effective teaching and learning of mathematics

The statistic shows that the majority of those with these challenges are those taught by non-professionally qualified teachers. The findings resulting from the third research question and hypothesis indicate that teacher-student relationship is significantly related to students' achievements in academics. In summary, no one qualification would suffice for the effective teaching of mathematics in secondary

school. Both academic and professional qualifications are pertinent to the effective teaching of mathematics in secondary schools

Summary

Given the current academic performance of secondary school students in mathematics, this study aimed at analyzing one of the possible factors that significantly influence the performance of students in mathematics. The research work was designed to investigate the effect of the qualification of mathematics teachers on the performance of secondary school students.

Based on the analysis, all the hypotheses were rejected and it revealed that there is a significant relationship between the qualification and experience of mathematics teachers and students' performance in mathematics in Udu Local Government Area, Delta State. Results from the study indicated that all independent variables, professional qualification and experience, teaching methods, and teacher-student relationship, when taken together had significant effects on the achievement of students in mathematics in Udu Local Government Area, Delta State.

CONCLUSIONS

This study has shown that the qualification of mathematics teachers have significant effects on the performance of secondary school students in Udu Local Government Area, Delta State. Therefore, it can be concluded from the results of this study that teachers' academic qualification, only, would not suffice to positively affect the academic performance of secondary school students. Professional qualification in the field of education is also pertinent to effective teaching and students' performance.

RECOMMENDATIONS

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

1. Government, through the Ministry of Education, should ensure that qualified and experienced teachers be employed into the school system. They can do this by ensuring that teachers with at least B.Sc. (Ed) in mathematics are recruited to teach mathematics in secondary schools.
2. Teachers should be exposed to periodic seminars, workshops, conferences, and in-service training to enhance their knowledge of mathematics and teaching skills. Teachers should consciously work to improve their teaching methods since it has been validated that there is a direct link between teaching methods of teachers and students' performance in a subject. Teachers should endeavour to explore all methods of teaching.
3. Teachers should be regularly supervised and monitored on the general aspect of teaching and learning.
4. Teachers should be given appropriate orientation on teacher-student relationship, its importance, and effects on students' performance. They should be able to establish good relationships with their students.
5. Regular and continuous professional development is paramount to developing and maintaining high quality science and mathematics teachers. The Ministry of Education should ensure that all the teachers have the chance to improve their classroom instruction by receiving ongoing training aimed at professional growth and better student outcomes.

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