IMPACT OF TEACHER VARIABLES ON SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN MATHEMATICS IN DUTSIN-MA METROPOLIS, KATSINA STATE, NIGERIA

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Abstract

This study investigated the impact of teacher variables on senior secondary school students' performance in mathematics in Dutsin-Ma metropolis, Katsina State, Nigeria. The researcher adopted descriptive design of correlational and survey types. The population of the study consisted of nineteen (19) Mathematics teachers in seven public senior secondary schools in Dutsin-Ma town, Katsina State, Nigeria. All the mathematics teachers were sampled purposively using the census sampling technique. The research comprised of one (1) research question and two (2) null hypotheses which were formulated and tested at a 0.05 level of significance. A modified 8-item self-administered questionnaire titled Teacher Quality Checklist (TQC), adapted from a study conducted by Wenglinsky (2012). The analyses of the results were carried out using independent t-test, and Pearson Product Moment Correlation. Findings from the study revealed that teachers' gender status does not have any impact on students' academic performance in Mathematics. The findings also showed that methods of teaching have a significant impact on students' performance, as the better the teachers' methodologies the higher the students' academic performance in mathematics. The researchers conclude that, teachers' methods of teaching have a tremendous impact on students' academic performance. Based on these findings, it was recommended that teachers should work on some skills that can improve their lesson planning, execution and teaching methods.

Keywords: Mathematics, Metropolis, Students' Performance, Teacher Variables

Introduction

The teacher's role is central to student academic performance in every subject taught in schools. Instructions/methodologies school-controlled variables have the most obvious impact on academic performance and student performance (Hopkins, 2017). This position is supported by Psacharopulos and Woodhall (2015), who highlight teachers as the most important factor that can affect school performance in a variety of cases. Secondary education is a very important stage in any educational system. This is because it is the foundation upon which higher education is built and the foundation of what children aspire to in their academic lives. Unfortunately, the performance of students at this level is very low across Nigeria (Adebule, 2014).

Although the 2019 Senior School Certificate Examination (SSCE), administered by the West African Examinations Council (WAEC), has improved significantly, Ntow, et al. suggested that the quality of students graduating from secondary school continues to decline each year, with only a small number of candidates taking the exam. 59.22% got 5 credits for 5 credits. Over subjects including English and Mathematics (WAEC, 2019). Students are said to be looking for crooked ways to pass exams.

Today, we often hear of "miracle centers" where parents encourage their children to enrol because they want them to pass. This is because exam success is a good motivator for students, teachers, administrators, and employers. On the other hand, failing an exam demoralizes everyone, especially students. The very foundation of our education system has been threatened by the desire to succeed and the avoidance of the frustration and embarrassment that comes with failure (Adeniji, 2019). This is not irrelevant to the quality of teachers in the education system because it negatively affects the quality of education.

Teachers play a key role in bringing about students learning and the role of the teacher is very vital in educating students in the school setting (Olutola, 2016; Olutola, Iliyas & Abdusalam, 2017). In addition, teachers' carry out a routine evaluation of school learning to achieve various objectives (Olutola, 2016). It is an accepted fact that teachers are the most important factor in the educational process and contribute to the success of educational programs launched by governments. Apart from being at the level of educational policy implementation, the implementation of these programs is highly dependent on the involvement and commitment of teachers (Adeniji, 2019). The following concept envisions selected factors working together to influence the delivery of quality secondary education (Figure 1).

Figure 1: Teacher Factors that have impact on student's performance in Secondary

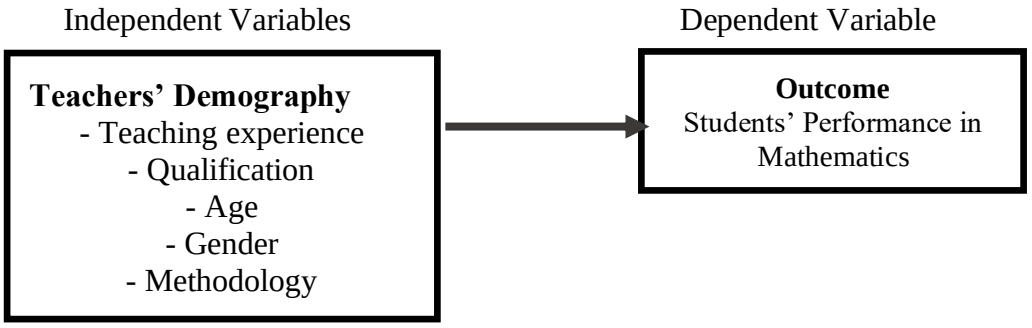

Figure 1 shows that various factors can have influence on the academic performance of secondary school students. Factors that positively influence the quality of education include appropriate academic background, teacher methodology, and years of teaching experience. Therefore, all independent variables can negatively or positively influence students' academic performance in secondary education, depending on the student's disposition and considering the influence of intervening variables.

According to Konstantinidou and Kyriakides (2022), effective education has positive influence for both boys and girls, but they are more pronounced for girls. Effective education is facilitated by educational methods. According to Adunola (2018), teachers teaching methods affect the academic performance of school students in Ijebu-Ode Local Local Government Area of Ogun State, Nigeria. The research suggested that teaching methods are as important as the subjects, and further buttressed that whether or not students understand what is being taught depends on the methods teachers use in conducting such lessons. Also, the research indicated that teachers can use any known conventional methods, depending on the target learner/audience and the nature of the lesson.

A knowledgeable teacher is someone who knows what to teach and has an idea of how to do it. It is known that once a child learns a basic fact, it can be incorporated into future lessons to impart later facts. Knowledgeable teachers are always looking for more efficient and effective methods. He/she applies a new procedure and assesses its effectiveness (Rosner, 2015). Considering the above statement

regarding the prominent role of teachers in improving the quality of education in the country, the Federal Government of Nigeria has made several attempts and enacted legislation for the development of education. Among these efforts are teacher training and recruitment laws enacted to achieve quality educational outcomes. The national policy on education emphasizes that only qualified and qualified teachers should be recruited into the Nigerian education system (NPE, 2015).

Statement of the Problem

The persistent problem of poor academic performance of Mathematics in WAEC senior secondary school examinations every year remains a major concern for stakeholders in the state and Nigeria in general. Researchers believe that the problem is due to much influence of Teacher-Related Variables impacting on the overall performance of the students. The curriculum is so demanding, Goldhaber and Brewer (2016) indicated that only experienced teachers with high academic qualifications can effectively teach the subject using a variety of strategies, methods, and tactics to advance learners in a traditional classroom setting. Obviously, in examining the overall impact of Teacher-Related Variables on teacher gender, qualification, attitude, workload, years of experience and student attitude to academic performance in WAEC/SSCE mathematics, requires further research. Therefore, this study examines how mathematics academic performance at the WAEC/SSCE in Dutsin-Ma metropolis is influenced by the combined impacts of teacher gender, academic qualification and teachers' years of experience.

Research Objectives

The general objective of this study is to:

1. determine the level of methodology used by Mathematics teachers in senior secondary schools in Dutsin-Ma metropolis, Katsina State, Nigeria.
2. find out the mathematics performance of senior secondary school students taught by male teachers and those taught by female teachers.

Research Questions

In an attempt to investigate the impact of teacher variables on senior secondary school students' academic performance in Mathematics in Dutsin-Ma metropolis, Katsina State, Nigeria, the following research question was sked to guide the conduct of the study:

1. What is the level of methodology adopted by Mathematics teachers in senior secondary schools in Dutsin-Ma metropolis, Katsina State, Nigeria?

Null Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance:

HO_1 There is no significant difference in the mathematics performance of senior secondary school students taught by male teachers and those taught by female teachers.

$H0_2$ There is no significant relationship between the mathematics performance of senior secondary school students taught by teachers with good use teaching methods and those taught without good teaching methods.

Methodology

The researcher(s) adopted descriptive design of correlational and survey types. The population of the study consisted of nineteen 19 Mathematics teachers in all the seven (7) public senior secondary schools in Dutsin-Ma town, Katsina State, Nigeria. The sample was drawn using the purposive sampling

technique, and with the use of census method to determine the sample size of all mathematics teachers from the research population.

A modified self-administered questionnaire titled Teacher Quality Checklist (TQC) used for this study was adopted from the United States of America National Assessment of Educational Progress (NAEP). Scoring of the questionnaire was based on the modified four-point Likert scale of measurement in this form; To a high extent (4), To some extent (3), Only slightly (2), and Not at all (1). The options of the items are weighted in the modified Likert format with The population of the study consisted of nineteen 19 Mathematics teachers in seven public senior secondary schools in Dutsin-Ma town, Katsina State, Nigeria which were all sampled purposefully using the census sampling technique.

The analyses of the results were carried out using independent t-test, and Pearson Product Moment Correlation.

Results

This study assessed the impact of mathematics teachers' variables in form of gender and the adoption of methodology on the performance of their secondary school students in mathematics. The statistical package of SPSS version 25 was used to analyze the data. A total of nineteen 19 teachers selected from seven (7) senior secondary schools were used. The analyses present the answer to research question and the test of research hypotheses. Both the hypotheses were tested at a 0.05 alpha level of significance.

Answer to Research Questions

Research Question One: What is the level of methodology adopted by Mathematics teachers in senior secondary schools in Dutsin-Ma metropolis, Katsina State, Nigeria?

Table 1: Response on the level of methodology adoption by the teachers in Mathematics

S/N	Methodology items	To a high extent (4)	To some extent (3)	Only slightly (2)	Not at all (1)	Mean
1.	I can use a wide range of teaching approaches in a classroom setting	4	15	0	0	3.211
2.	I can adapt my teaching style to different learners	10	9	0	0	3.516
3.	My methods help me to assess student's performance in a classroom	12	7	0	0	3.632
4.	I am familiar with common students understandings and misconceptions.	6	`10	2	0	3.053
5.	I can assess student learning in multiple ways.	10	9	0	0	3.516
6.	I know that different mathematical concepts do not require different teaching approaches.	5	6	8	0	2.842
7.	I know that different literacy concepts do not	0	7	6	6	2.053

	require different teaching approaches					
8.	I know how to select effective teaching approaches to guide student thinking and learning in mathematics.	8	6	0	5	2.895

Cumulative mean = 3.090; Decision Mean = 2.50

Table 2 shows the level of teachers' adoption of teaching methodologies in the teaching of mathematics which is appreciably very high. The reason is that their cumulative level of methods used was 3.090 which is higher than the standard/decision mean level of 2.500. Specifically, most assert that "My methods help me to assess student's performance in a classroom". As this view attracted the highest mean of 3.632 thereby the details showed that while a total of 12 of the teachers picked to a very high extent the remaining 7 said to some extent. In the same vein, most teachers adapt "my teaching style to different learners and can assess student learning in multiple ways". These two attracted the second-highest mean of 3.516 as in each case 10 of the teachers representing 53.0% said to a very extent and the rest 9 or 47.0% said to some extent. The same distribution goes to those who chose "I can adapt my teaching style to different learners". In summary, the extent of teachers' adoption of the teaching methodology is very high especially as most know how to assess student performance in a classroom and can adapt their teaching styles to different learners can assess student learning in multiple ways

Testing of Hypotheses

Hypothesis One: There is no significant difference in the mathematics performance of senior secondary school students taught by male teachers and those taught by female teachers.

This hypothesis is tested with t-test on the difference in the performance of students taught based on the teachers' gender.

Table 5: Independent t test on the difference in the performance of students taught by Male and female teachers.

Gender	N	Mean	SD	Df	t-Cal.	Sig. of t (P-value)	Decision
Male	13	53.11	23.12				
				17	0.104	0.922	Accepted
Female	6	54.95	7.35				

Results from 5 shows that there is no significant difference in the mathematics performance of senior secondary school students taught by male teachers and those taught by female teachers ($t = 0.104$; $df = 17$; $p > 0.05$). This result shows that teachers' gender has no significant impact on their students' performance, and therefore, the null hypothesis is hereby accepted and retained. The mean students' academic performances are 53.11 and 54.95 by male and female teachers respectively but not statistically significance.

Hypothesis Two: There is no significant relationship between the mathematics performance of senior secondary school students taught by teachers with good use teaching methods and those taught without good teaching methods.

This hypothesis is tested with the Pearson Product Moment correlation (PPMC) because both variables

are quantifiable and parametric.

Table 6: Pearson Product Moment correlation (PPMC) showing relationship between Teacher's methodology and students' academic performance in Mathematics

Variable	Correlation, Sig. & N.	Teacher's methodology	Students' performance in Mathematics
Teacher's methodology	Pearson Correlation	1	0.894*
	Sig. (2-tailed)		0.012
	N	19	19
Students' performance in Mathematics	Pearson Correlation	0.894*	1
	Sig. (2-tailed)	0.012	
	N	19	19

Note: * means significant at 0.05 alpha level of Significance

Table 5 reveals a high positive correlation (r- value = .0.894*) which is significant at 0.05 alpha levels of significance (r = 0.894*, p <0.05). Therefore, the null hypothesis two is rejected. This means that, there is significant relationship between the mathematics performance of senior secondary school students taught by teachers with good use teaching methods and those taught without good teaching methods. The relationship between the two variables is directly proportional, that is, the higher the level of teachers' methodology adopted, the higher the students' performance in Mathematics and vice versa.

Discussion of Findings

The study aimed at finding the impact of teachers' gender and methodology on senior secondary school students' performance in mathematics in Dutsin-Ma, Katsina State, Nigeria. One research questions and two null hypotheses were formulated to guide the study. The null hypotheses were tested by sample t-test and Pearson Product Moment Correlation at a 0.05 level of significance.

Null hypothesis one stated that there is no significant difference between the mathematics performances of students taught by male teachers and those taught by female teachers. Therefore, the null hypothesis is hereby accepted and retained because This agrees with Igberadja (2016) who revealed that the teachers' gender and qualification do not have any significant effects on students' performance that are being taught Industrial Safety. This also goes against the study of Rosner (2015) who stated that students taught by male teachers tended to score higher than those taught by female teachers.

Null hypothesis two states that there is no significant relationship in Mathematics performances between students taught by teachers with good use of teaching methods and those not taught with good use of teaching methods. This hypothesis is also rejected for the reason being that the calculated p-value of 0.012 is lower than the 0.05 alpha level of significance at a correlation index r-value of 0.894 at df 17. The relationship between the two variables is directly proportional, that is, the higher the level of teachers' methodology adopted the higher the students' performance and vice versa. The result of these findings is in agreement with Konstantinidou and Kyriakides (2022) who stressed that effective teaching is facilitated by teaching methods.

Conclusion

The study showed that while teachers' gender status does not have impact on students' academic achievement, their methods of teaching has a tremendous impact on their students' academic performance.

Recommendations

The following recommendations are put forward:

1. Teachers should work on some skills that can improve their lesson planning, execution, teaching methods. This will benefit both the teachers and the students.
2. Teachers should improve their teaching methods by testing different ones using the same lesson, and also meeting with other teachers to get their perspectives and remaining flexible.
3. Teachers can use effective teaching methods that educators have been using throughout history to help the students learn. Paying attention to the way you teach students, in addition to the content you convey to them, is a critical part of ensuring they master subjects and abilities.
4. Teachers should conduct research and consult with experienced teaching professionals to find inspiration for how one can operate his/her classroom effectively. Multiple people can be consulted to confirm that one's lessons are appropriate before implementing them to ensure their success.

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