

TEACHER VARIABLES AND PUPILS PERFORMANCE IN MATHEMATICS IN PUBLIC PRIMARY SCHOOLS IN RIVERS STATE**Princewill Okechukwu Ejekwu****Department of Primary Education Studies****Ignatius Ajuru University of Education, Port Harcourt Rivers State, Nigeria****ABSTRACT**

The teaching of mathematics is very vital in Nigerian educational system particularly in the light of the current global technological advancement. The teacher is at the heart of this business of teaching and learning of mathematics. This study examined teacher variables and pupils academic performance in mathematics in public primary schools in Rivers State. An ex post facto research design was adopted for the study. Population of the study consisted of 9973 teachers in public primary schools in Rivers State. The sample size of the study was 997 teachers in the public primary schools. This was obtained using the stratified random sampling and simple random sampling technique. Four research questions and four null hypotheses were formulated to guide the study. The hypotheses were analyzed using Regression analysis. The results of the study showed that there is a significant relationship between teachers' gender, years of experience, knowledge of subject matter, educational qualification and pupils' academic performance in mathematics in public primary schools. Based on the findings of the study recommendations were made, among which was, Government should ensure that only qualified and competent mathematics teachers are employed to teach mathematics at the primary level of education, considering the fact that this level is the foundation for all the other levels of education. The man-know-man syndrome used in employment should be discouraged.

Keyword: Teacher Gender, Teaching Experience, Knowledge of Subject Matter, Teacher Qualification

INTRODUCTION

Education is a social activity. The main object of edification is to put the coming generation in order. For this, every segment of society plays its part to make it a success. At home, parents contribute to the provision of knowledge. Out in the surroundings, other factors also affect the process of learning. Media has also its distinct role. But in this connection the teacher excels. The teacher is like a grower who keeps constant watch on the crop of the coming generation (Aziz, 2010). The standard of education constitutes the general caliber of citizenry. The qualitative approach of teaching can be managed through the teachers. It is beyond all doubt that the entire march of civilization is centered on the performance of the teachers exhibited in the class room (Aziz, 2010).

Education implies to the structuralization of the socio-psychological, thematic and ethical values of individuals and groups in a manner which helps to capacitate them for acquiring the complete cognizance of life (Aziz, 2010). It also imparts the necessities which can be helpful to acquire these purposes. The National Centre for Education Standard (2000) measured and found that teacher factor stands as a major pivot in students' general achievement and mathematics in particular. Sharehu (2010) identified a number of factors that are responsible for the decline in the quality of teaching and learning at the primary school level. The factors are inadequate infrastructure, poor teaching and learning environment, lack of basic teaching materials, non-challant attitude of parents and low quality of teachers. In the same vein, Babatunde (2013) also pointed out that the teacher being a curriculum implementer and guide to the learner needs to know what to teach, how to teach it and how to ensure that learning takes place. Professional development of teachers, therefore, in whatever form, is important for effective lesson delivery (California Council on Science & Technology, 2010). As stated by Babatunde (2009), the skills and knowledge teachers take to the classroom determines to a large extent what takes place in the class.

Escardibul and Mora (2013) stated that teacher gender is related to students' academic achievement as well as in relation to their motivation for the subject of mathematics.

Teacher Variables and Pupils Performance in Mathematics in Public Primary Schools in Rivers State

In collaborating this view, Krieg (2005) in his study, shows that the students of female teachers are more likely to score well on the mathematics, reading and writing.

The teacher is a significant factor in the ability of the primary school pupils to understand, utilize and love mathematics. Ibebuike (2006) in Daso (2013) had noted that many students, even as far back as their primary school days did not take interest in mathematics to a meaningful degree; remarking that methods of instruction were not very favorable to these students. He posited that this was due to the paucity of competent and adequately qualified mathematics teachers who were invariably over labored. Akpo (2012) in collaborating this view argued that, in seeking to improve the Mathematics education of all students, it is important to understand the connection between the inputs (teacher qualifications and characteristics), processes (teachers practices and teaching quality), and outcomes (teacher effectiveness based on students' achievement in Mathematics).

Shulman (1986) in Boyd (1992) identified various components of the knowledge base necessary for teaching. Specifically, he proposed a theoretical framework consisting of three categories of content knowledge: subject matter content knowledge, pedagogical content knowledge, and curricular content knowledge. Subject matter content knowledge was characterized as more than the information a teacher knows. Shulman indicated that teachers needed to know about both the content of their subject and the structure of their subject, that is, how the content fits together. They needed to know “what” is true, “why” it is true, and why it is worth knowing in the first place (Shulman, 1986).

Pedagogical content knowledge was “the particular form of content knowledge that embodies the aspects of content most germane to its teachability” (Shulman, 1986, p. 9). In other words, “good teachers not only know their content but know things about their content that make effective instruction possible” (Grossman, Wilson, & Shulman, 1989, p.25). This aspect of content knowledge included having a variety of representations available for specific topics, understanding the intrinsic difficulties that are a part of these topics, being aware of the variety of conceptions, preconceptions and misconceptions related to specific topics, and knowing and using strategies that would be helpful in overcoming these misconceptions.

Curricular content knowledge, Shulman's third category, had three parts. First was knowledge and understanding of alternative curriculum materials available for specific topics. Second was lateral curriculum knowledge, or familiarity with the curriculum concurrently studied in other subjects. Third was vertical curriculum knowledge, or familiarity with what the students have been taught in preceding years and what they will learn in the future about specific topics.

Teachers must be well versed in mathematics in order to teach the subject effectively. Without such breadth and depth of mathematical knowledge, teachers are likely to rely too heavily on the textbook, to present the content in a fragmented way without sufficient explanation of key concepts or problem-solving strategies, and to be ineffective at individualizing instruction, diagnosing error patterns, or responding to unanticipated difficulties or opportunities that arise during instruction. There is a gap between the teachers' pedagogical content knowledge and their teaching practices (NCHE, 2007). These observed deficiencies can affect the quality of student outcomes in Mathematics (Akpo, 2012). Conant (1963) in Jadama (2014) stressed that the subject matter knowledge level of a teacher on topics has a direct bearing on the students' understanding of the subject matter. This invariably will affect the performance of the student.

Budding & Zamarro (2009) found out that Student achievement increases with teacher experience. In the same vein, Clotfelter, Ladd and vigdor (2006) stressed that teacher experience is consistently associated with achievement. In collaborating this view, Fetler (1999) opined that teacher experience, measured by the average number of years in service, is positively related to test results of students. In his study, Rugraff (2004) found teachers' salaries and levels of education affected student achievement, but the years of experience of teachers had little to no effect on achievement and the dropout rate. Taylor (2011) finds that, when combined with time on task, teacher knowledge leads to substantial gains in student learning. However, this only occurs at a very high level of knowledge, indicating a non-linear relationship between teacher knowledge and learner performance. Primary education was chosen for this study since it is the foundation on which all the other educational levels are built on.

Statement of the problem

There has been a widespread failure in Mathematics which has hindered majority of students in Rivers State students to acquire the necessary knowledge and qualifications necessary to enter scientific and technological careers.

Journal of Educational Research and Policies, Volume 10, Number 2, 2015

Mathematics is a prerequisite subject that a student must pass in the primary education and secondary education. As important as the subject is to the primary school child, the rate of pupils' failure of the subject is still on the increase. This failure rate could be as a result of several factors, which may include students in primary schools being exposed to ineffective teaching since a large proportion of the teachers lack essential competencies such as mastery of their teaching subjects, good English proficiency, reading skills, elicitation skills, curriculum interpretation, and skill in setting student tests; use of inappropriate instructional materials; unfriendly school climate. These weaknesses limit the effectiveness of the teachers. Therefore, is there any relationship between teacher variables and pupils' academic performance in mathematics in primary schools in Rivers State?

Purpose of the study

The purpose of this study is to determine the relationship between teacher variables and pupils' academic performance in mathematics. Specifically, the study will want to:

- (1) Determine if there is any relationship between teacher's gender and pupils' academic performance in mathematics in public primary schools.
- (2) Determine if there is any relationship between teacher's years of experience and pupils' academic performance in mathematics in public primary schools.
- (3) Determine if there is any relationship between teacher's knowledge of subject matter and pupils' academic performance in mathematics in public primary schools.
- (4) Determine if there is any relationship between teacher qualification and pupils' academic performance in mathematics in public primary schools.

Null Hypotheses

The following null hypotheses will further guide the study:

- (1) There is no significant relationship between teacher's gender and pupils' academic performance in mathematics in public primary schools.
- (2) There is no significant relationship between teacher's years of experience and pupils' academic performance in mathematics in public primary schools.
- (3) Teacher's knowledge of subject matter does not significantly relate with pupils' academic performance in mathematics in public primary schools.
- (4) There is no significant relationship between teacher qualification and pupils' academic performance in mathematics in public primary schools.

METHODOLOGY**Design of the study**

The study adopted the ex post facto research design. This design was adopted since the researcher will not manipulate the data but will rather use them as they appear. According to Kerlinger (1986), this design is directed towards determining the nature of a situation as it exists at the time of investigation.

Population of the study

The population of the study will consist of all the 9,973 primary school teachers in the 943 public primary schools in Rivers State.

Sample and sampling technique

A sample of 997 public primary school teachers taken from the 96 sampled public primary schools constituted the sample size for the study. The sample had 754 females and 243 males. The sample was chosen using simple random sampling technique.

Instrument for data collection

The instruments for data collection were the researcher designed 20-item questionnaire titled "Teachers' Variables and Pupils' Academic Performance in Mathematics in Primary Schools Questionnaire" (TVPAPMPSQ); and Mathematics Achievement Test result from the class teacher. The questionnaire has two sections: section A will seek to gather the demographic data of the respondents, while the items in section B will be used to answer the research questions. The instrument will be in the likert form with the following scale:

Teacher Variables and Pupils Performance in Mathematics in Public Primary Schools in Rivers State

Weightage of scale	Abbreviation	Score
Strongly Agree	SA	5
Agree	A	4

Teacher Variables and Pupils Performance in Mathematics in Public Primary Schools in Rivers State

Undecided	UD	3
Disagree	D	2
Strongly Disagree	SD	1

Validation of the Research Instrument

The questionnaire instrument was validated by two specialists in the Departments of Early Childhood Education, and Educational Foundations, Guidance and Counselling in the Faculty of Education, University of Uyo for content and face validity. These experts careful and critical examination of the instrument in terms of relevance, content clarity and difficult level was used to modify the instrument after due scrutiny from the specialists for face and content validity.

Reliability of the Instrument

Test-retest method was used to establish reliability coefficient of the questionnaire. The instrument was administered on 30 primary school teachers in private primary schools in Rivers State, who were outside the population of the study, since they will not be part of the sample for the study. Cronbach alpha coefficient was used for the calculation of reliability index. This revealed the reliability coefficient of the instrument as being 0.71. With this level of reliability coefficient, the instrument was considered to be highly reliable for this study.

Method of data analysis

Regression analysis was used to test the null hypotheses at 0.05 level of significance.

RESULT OF FINDINGS AND DISCUSSIONS

Null hypothesis one: There is no significant relationship between teacher's gender and pupils' academic performance in mathematics in public primary schools.

Table 5: summary of Regression analysis for hypothesis one.

Model	Sum of Squares	Df	Mean Square	Fcal	Frcrit	Decision
1 Regression	195.053	2	97.527	145.937	3.087	*
Residual	372.232	995	.668			
Total	567.286	997				

*=significant at .05 alpha level and df (2, 995)

Table 5 shows the significant test using regression for the relationship between Teacher Gender and Students academic performance. The result shows that the calculated f value is 145.94 and the critical f value at .05 alpha level is 3.087. Since the fcal is greater than the fcrit, the null hypothesis is rejected. Thus, there is a significant relationship between Teacher Gender and Pupils' academic performance.

This finding is consistent with the views of Escardibul and Mora (2013) who states that teacher gender is related to students' academic achievement as well as in relation to their motivation for the subject of mathematics. The finding is also in agreement with the views of Krieg (2005) who asserts that the students of female teachers are more likely to score well on the mathematics, reading and writing.

Null hypothesis two: There is no significant relationship between teacher's years of experience and pupils' academic performance in mathematics in public primary schools.

Journal of Educational Research and Policies, Volume 10, Number 2, 2015

Table 6: summary of Regression analysis for hypothesis two

Model		Sum of Squares	df	Mean Square	Fcal	Fcrit	Decision
1	Regression	193.790	1	193.790	289.521	3.087	*
	Residual	373.496	996	.669			
	Total	567.286	997				

*=significant at .05 alpha level and df (1, 996)

Table 6 shows the significant test using regression for the relationship between Teachers years of experience and Pupils' academic performance in mathematics. The result shows that the calculated f value is 289.52 and the critical f value at .05 alpha level is 3.087. Since the fcal is greater than the fcrit, the null hypothesis is rejected. Thus, there is a significant relationship between Teachers years of experience and Pupils' academic performance in mathematics.

This finding agrees with the findings of Budding & Zamarro (2009) that Student achievement increases with teacher experience. The finding also agrees with the views of Fetler (1999) who opines that teacher experience, measured by the average number of years in service, is positively related to test results of students.

Null hypothesis three: Teacher's knowledge of subject matter does not significantly relate with pupils' academic performance in mathematics in public primary schools.

Table 7: summary of analysis for hypothesis three

Model		Sum of Squares	df	Mean Square	Fcal	Fcrit	Decision
1	Regression	4.538	1	4.538	4.500	3.087	*
	Residual	562.747	996	1.009			
	Total	567.286	997				

*=significant at .05 alpha level and df (1, 996)

Table 6 shows the significant test using regression for the relationship between Teachers Knowledge of Subject Matter and Pupils' academic performance in mathematics. The result shows that the calculated f value is 4.5 and the critical f value at .05 alpha level is 3.087. Since the fcal is greater than the fcrit, the null hypothesis is rejected. Thus, there is a significant relationship between Teachers Knowledge of Subject Matter and Pupils' academic performance in mathematics.

Again, this finding is consistent with the views of Conant (1963) in Jadama (2014) who stresses that the subject matter knowledge level of a teacher on topics has a direct bearing on the students' understanding of the subject matter.

Null hypothesis four: There is no significant relationship between teacher qualification and pupils' academic performance in mathematics in public primary schools.

Table 8: summary of Regression analysis for hypothesis four

Model		Sum of Squares	df	Mean Square	Fcal	Fcrit	Decision
1	Regression	24.140	1	24.140	24.800	3.087	*
	Residual	543.146	996	.973			
	Total	567.286	997				

*=significant at .05 alpha level and df (1, 996)

Table 6 shows the significant test using regression for the relationship between Teachers qualification and Pupils' academic performance in mathematics.

Teacher Variables and Pupils Performance in Mathematics in Public Primary Schools in Rivers State

The result shows that the calculated f value is 24.8 and the critical f value at .05 alpha level is 3.087. Since the f_{cal} is greater than the f_{crit} , the null hypothesis is rejected. Thus, there is a significant relationship between Teachers qualification and Pupils' academic performance in mathematics.

This finding is in agreement with the views of Sharehu (2010) who stresses that a number of factors are responsible for the decline in the quality of teaching and learning at the primary school level; these factors include inadequate infrastructure, poor teaching and learning environment, lack of basic teaching materials, non-challant attitude of parents and low quality of teachers.

Educational implication of the study

The classroom teacher is an important factor and player in the implementation of the primary school mathematics curriculum. The academic performance of the primary school pupils, among other things, is hinged on the effectiveness of the teacher. Consequently, employment of qualified teachers to teach mathematics in the primary school cannot be over-emphasised.

The teaching and learning of mathematics in the primary school will be less difficult and effective if the mathematics teachers at the primary school level have a sound knowledge of the subject matter which they are to teach. This also means that teachers who motivate pupils in the learning of mathematics in the primary school should be motivated to give their best.

CONCLUSION

The teaching of mathematics in the primary school is very vital particularly with the need for Nigeria to catch up with the global technological advancements. The teacher is at the heart of this business of teaching and learning of mathematics. The onus, therefore, rests on the teacher to obtain the right qualification in mathematics, have a rich background knowledge of the subject matter and make proper use of his/her wealth of experience in teaching mathematics. Female mathematics teachers at the primary school should understand their important role in mathematics lesson delivery.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

- (1) Government should ensure that only qualified and competent mathematics teachers are employed to teach mathematics at the primary level of education, considering the fact that this level is the foundation for all the other levels of education. The man-know-man syndrome used in employment should be discouraged.
- (2) Headteachers and the ministry of education should encourage primary school teachers to participate in in-service training through seminars, workshops and conferences.
- (3) The government should consider employing more competent male teachers in the primary schools.
- (4) Mentorship should be encouraged for newly employed teachers so as to enable learn from the skilled teachers who have spent a good number years teaching.

REFERENCE

- Babatunde, A.A. (2009). Some teachers' factors as correlates of pupils learning outcomes in core subjects in primary schools in South Western Nigeria. Unpublished Ph.D Thesis, University of Ibadan.
- Babatunde, O.E. (2013). Evaluation of the NTI/MDGs capacity building programme in English Language teaching in primary schools in Oyo State Nigeria. Unpublished Ph.D Thesis, University of Ibadan, Nigeria.
- Boyd B.A.(1992). The Relationship Between Mathematics Subject Matter
- Bransford, J.D., Brown, A.L, & Cocking R.R. (Eds). (1999). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academy Press.
- Budding, R.,& Zamarro, G. (2009). *Teacher qualifications and student achievement in urban elementary schools*. Santa Monica, CA: RAND Corporation. Retrieved from http://www.relmidwest.org/sites/default/files/RDR2015_01_QP10201638_Teacher Experience and Student Achievement.pdf

Journal of Educational Research and Policies, Volume 10, Number 2, 2015

- California Council on Science and Technology (2010): The preparation of elementary school teachers to teach science in California: Challenges and opportunities impacting teaching and learning science. Sacramento California. Retrieved from <http://www.ccst.us>, June 28, 2010.
- Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2006). Teacher–student matching and the assessment of teacher effectiveness (NBER Working Paper No. 11936). Cambridge, MA: National Bureau of Economic Research. Retrieved from http://www.relmidwest.org/sites/default/files/RDR2015_01_QP10201638_Teacher_Experience_and_Student_Achievement.pdf
- Daso,P.O.(2013). Teacher Variables And Senior Secondary Students’ Achievement In Mathematics In Rivers State, Nigeria. *European Scientific Journal*, 9,(10) 1857 – 7881
- Grouws, D.A., & Cebulla, K.J. (2000). *Improving students’ achievement in Mathematics part 1: Research findings*. Columbus OH: Eric/Csmee.
- Hafiner, A.L. (1993). Teaching methods scales and Mathematics-class achievement: What works with different outcomes? *American educational research Journal*, 330(1), 71-94.
- Jadama,M.J. (2014).Impact of Subject Matter Knowledge of a Teacher in Teaching and Learning Process. *Middle Eastern & African Journal of Educational Research*, 7(20)
- Knowledge And Instruction: A Case Study. An unpublished Thesis
- Krieg, J. M. (2005). Student gender and teacher gender: what is the impact on high stakes test scores? *Current Issues in Education* 89. Retrieved from <http://cie.asu.edu/volume8/number9/index.html>
- Mbajiorgu, N.M (2003). *Science: The teachers’ perspective an introduction to science education*. Enugu: Institute for Development Studies.
- Rugraff, Donald R. The Relationship of Teacher Salaries, Teacher Experience, and Teacher Education on Student Outcomes. Diss. St. Louis Univ., 2004. Retrieved 29 Oct. 2015 <http://www.bekeru.edu/images/pdf/SOE/EdD_Thesis/Dial_Jaimi.pdf
- Sharehu, H.M. (2010). *Nationwide capacity building programme for primary school teachers under the 2010 Millennium Development Goals (MDGs) project*. Kaduna: NTI Press
- Shepherd, D.L (2013).The impact of teacher subject knowledge on learner performance in South Africa: A within-pupil across-subject approach. Retrieved 29 Oct. 2015. http://www.iwaae.org/papers_sito_2013/shepherd.pdf
- Zemelman, S., Daniels, H., Hyde, A. (1998). *Best practice: New standards for teaching and learning America’s schools* (2nded.). Portsmouth, NH: Heinemann.