

Teacher Quality Factors as Determinant of Students' Achievement in Mathematics

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Abstract

This paper tries to find out the effect of teacher quality factors on students achievement in Mathematics. The teacher qualities that were considered in the study include teachers' experience, qualification motivation interest satisfaction and teaching techniques. The data for the study were collected through the questionnaires designed for the teachers and students result collected. Analysis of variance (ANOVA) and regression analysis were used to analyze the data. It was found out that all the teacher qualities considered in the study determine the achievement of student in Mathematics to a large extent.

Keywords: Teacher Quality, Achievement, Motivation, Teachers' Qualification, Experience

1. Introduction

Mathematics is a universal subject; the knowledge of it is not only necessary for successful schooling but also unavoidable for human survival in everyday life. There is hardly any field of study where Mathematics is not usefull. The farmers, carpenters, hunters, housewives and so on make use of it even though they may not be aware of it. The importance of Mathematics in its ramification cannot be overemphasized in our present scientific and technological age.

Markarfin (2001) states that mathematics is universal not only in the way it influence the basic sciences, applied science, engineering and technology but also, its influence on day to day activities.

Odogwu (2002) noted that apart from its usefulness in sciences and technology, mathematical skills are utilized in areas like painting, music, management information systems, traffic control, accounting and wide range of application. He explained further that in recognition of its usefulness, the federal government of Nigeria through the national policy on education (FRN 2004), made mathematics one of the core subjects to be offered at both the primary and secondary school level of education.

Eraikuemen & Oteze (2001) explained that mathematics with it utilitarian value in buying and selling, in record keeping, in understanding and appreciating nature, in critical thinking and logical reasoning has the potential to sustain pupils' interest in the formal school system. Similarly, Herborpeters (2001) submitted that mathematics remains the pivot on which any true science cannot succeed without going through mathematics demonstration. Adegboye (2003) equally observed that the usefulness of mathematics in other fields of study as well as in human race such as arts, social sciences, religions, mysticism, in commerce, war, and personal life. The researcher further explained that the decorative art has contributed to the appreciation of geometry, religion and commerce which led to the development of number, while war led to the interest in mathematics programming and so on. The other areas of its usefulness include architectural designing construction of bridges and dams and high ways.

Aremu (1998) opine that the importance of mathematics as a necessary tool needed for the purpose of economic survival for the students' academic performance for the realization of national goals and objectives.

Statement of the Problem

The success or failure of any academic programme depends largely on the teacher who is the major implemental of the curriculum. The poor achievement of students in Mathematics has been traced to teachers' inability to adequately pass Mathematics instruction to students (Adeniyi, 2012 & Ayinla, 2012). This study therefore examined teacher quality factors as determinants of students' achievement in mathematics in Irepodun Local Government Area of Kwara State, Nigeria. The teacher quality factors considered in this study were teachers' experience, qualification, motivation, teachers' interest/satisfaction, teaching techniques and classroom control ability.

1.1 Hypotheses

The hypotheses tested in the study include:

HO₁: There is no correlation between teachers' quality factors and students' academic achievement in mathematics

HO₂: There is no significant composite effect of the six teacher quality factors on students' achievement in mathematics

HO₃: There is no significant relative effect of the six teacher quality factors on students' achievement in mathematics

1.2 Significance of the Study

The findings of this study would provide information on the teacher quality factors which determine students' achievement in mathematics. This would help mathematics teachers to know their roles in the achievement of students in mathematics. Also, for teachers without the minimum academic qualifications, there may be need for them to go for further or appreciate training so as to improve their knowledge and effectiveness in the teaching of mathematics. Also, this study would enable respective school authorities to identify or observe the importance of minimum academic qualification for teachers of mathematics in their various schools.

Furthermore, the result of this study would be of help to the ministry of education both at the state and federal levels in their policy formulations

Finally, the findings of this study would enable the government to know the best ways to treat teachers in order to enhance highest teaching productivities.

1.3 Scope of the Study

This study covers secondary schools in Irepodun Local Government Area of Kwara State. 20 schools were randomly selected from the senior secondary schools in Irepodun Local government area of Kwara state, Nigeria. All teachers and students in the selected schools were included in the study.

2. Literature Review

For a teacher to be the 'Master' of his/her class, he has to be adequately informed of the content of the instruction he has to pass across to the students and must know the best method to be used in adequately passing across the instruction.

Also, for teaching to be rewarding and effective in Nigeria, qualification of teachers in terms of prescribed certificate should not be relegated rather; prospective teachers and teachers already on the job who do not possess the minimum required academic qualification should ensure that they go for training so as to be certified and qualified professionals.

Ukeje (1970) expressed the prime importance of teacher qualification to the educational development of any nation. The researcher sees teacher as the centre of any academic programmes. That is, good qualification of teachers' would lead to better performance of students and there is likely to be a link between pupils' performance and teacher effectiveness and between performance and classroom atmosphere. Adesina (1981) perceived the need for improving teacher qualification and according to him teaching experience determine students' achievement to a great extent.

The teacher can greatly influence the performance of children since their remarks, interest, attitude and methodologies affect students' performance at school (Fakinde, 1978). Farrant (1980) believes that for a teacher to be efficient at his work, he should have a sound knowledge of all that the content, method and sequentially arrange work to meet the individual needs of his pupils, using the environment.

The teacher is required to transmit what is spelt out in the curriculum content. Therefore, the teacher becomes the basis from which desirable experiences are made available to learners. Hence, teachers' must make it necessary to avail themselves of the fundamentals that are required in teaching if their activities in the classroom will be meaningful.

Adebanjo (1999) found out that improper teaching methods affect students' performance and if a teacher does not know how to communicate properly or use proper channel of communication, the students are bound to learn the wrong thing. He also found out that improper teaching methods and inadequate language of instruction tend to slow down the academic performance of the students. Moreover, Pierce and Lorber (1979) cited in Adebanjo (1999) emphasized the importance of varying teaching methods in order to stimulate and sustain interest as well as facilitate achievement of instructional objectives.

Adesina (1981) stated that teacher is required to give knowledge and train students the basic skills as stipulated in the curriculum and provide guidelines for effective teaching in class. That is to say in the school setting, the teacher and school curriculum are inseparable factors in ensuring success or failure of any intended learning outcome.

Ekwewe (2001) states that a well-planned curriculum is not guarantee that learning take place but for

the teacher who is competent and a pupil who is reasonably motivated and ready to learn. An incompetent teacher can destroy any teaching programme. There is the need for emphasis on appropriate and adequate intellectual training of teacher in the interest of teachers in particular and students who are always at the receiving end.

Omosewo (1998) found that there is a significant difference in the performance of physics students taught by qualified teacher and those taught by unqualified teachers. The sample for her study constitutes fifteen physics teachers from Kaima and Moro Local government Areas of Kwara State, Nigeria. The qualifications of the teachers are B.Sc (Ed) physics (1 teacher), NCE Math/Physics (10 teachers) and HND in Engineering (4 teachers).

The education of the pupils is always the self-education of the teacher. In conclusion, it is the sole responsibility of the teacher to make sure that students gain the resources as stipulated in the school curriculum. The extent to which a teacher will achieve depends largely on his/her academic competency in the subject. Hence, the teacher must try to make himself/herself worthy of his calling and fulfill the requirement for effective teaching.

3.0 Methodology

3.1 Research Design

The researcher adopted the descriptive method of the survey type. A descriptive study of the survey type is a method of research that investigates phenomenon in their natural setting and describes the true picture of the events. The researcher used questionnaire to get true information about the teachers' attitude to work, interest, qualification and experience in relation to students' achievement in mathematics.

3.2 Sample and Sampling Procedure

The population for the study was the students and all the mathematics teachers in the secondary schools in Irepodun Local Government Area of Kwara State. The researcher used stratified random techniques to select the twenty schools. The twenty schools were selected in such a way that cuts across the whole local government area. The selection procedure took care of the secondary schools in the urban and rural areas of the local government, S S 1 students and S S 1 mathematics teachers were involved in the study.

3.3 Instrumentation

A questionnaire was designed for teachers and it consists of two sections. Section A was on personal data of the teachers such information includes teachers' sex; academic qualification and years of teaching experience. Section B was designed to test teachers' attitudes to mathematics teaching. Also, the results of the students taught by each teacher of mathematics who were involved in the study were also collected along side with the questionnaire answered by such teacher.

3.4 Procedure for data collection

The researcher personally administered the questionnaire to the mathematics teachers in each school. The questionnaires were collected by the researcher before leaving each school. Also, the last term results of the students taught by each mathematics teacher were collected together with the questionnaire.

3.5 Method of Data Analysis

To analyze the result of the data collected in this study, Analysis of Variance (ANOVA) and Multiple Regression were employed. These were used to investigate the relationship between teacher quality factors and students' achievement. For the purpose of this study, 0.05 alpha level of significance was adopted in testing the hypotheses.

4.0 Result

4.1 Analysis of Research Result

HO₁: There is no correlation between teacher quality factors and students' academic achievement in mathematics

Table 1

Table 1 revealed that all the 6 teachers' quality factors taken together correlate positively with achievement in mathematics ($r = 0.22$). They also account for 4.40% of students' achievement in mathematics; the remaining 95.60% is due to other factors apart from the six teacher quality factors that were considered in this study.

HO₂: There is no significant composite effect of the six teacher quality factors on students' achievement in mathematics

Table 2

Table 2 revealed that the six teacher quality factors were significant that is, all the variables put together have composite effect on students' achievement in mathematics ($F = 7.732, P < 0.05$).

HO₃: There is no significant relative effect of the six teacher quality factors on students' achievement in mathematics.

Table 3

From table 3, the first on the list of magnitude to contribute to students achievement in mathematics is teachers' interest and satisfaction ($\beta = 0.224, T = 5.435, P < 0.05$). There is a significant relationship between interest satisfaction and students achievement in mathematics.

The second in the magnitude of relative contribution is teachers' motivation ($\beta = 1.434, T = 5.435, P < 0.05$). The relationship is significant while the third on the list of magnitude of relative contribution is teachers' teaching techniques. ($\beta = 0.128, T = 3.467, P < 0.05$). This is also significant.

The fourth on the list is teachers' classroom control ability ($\beta = 0.089, T = 2.346, P < 0.05$). The relationship is also significant. The fifth of the list of magnitude of relative contribution is teachers' qualification ($\beta = 0.62, T = 0.242, P < 0.05$). This relationship is significant.

The last on the list on magnitude of relative contribution is teachers' experience ($\beta = 0.011, T = 1.76, P < 0.05$). This relationship is also found to be significant

4.2 Conclusion

From the findings of this study, teachers' satisfaction, motivation, interest, classroom control ability, teaching techniques/methods and teachers' experience determine the achievement of students in mathematics to a large extent. This could be applicable to other subjects especially science oriented subjects.

4.3 Recommendation

In view of the findings of the study, the researchers wish to recommend the following:

1. Government at all levels should be concerned with observable low level of morale among teachers and they should be concerned with how best to motivate teachers to perform effectively
2. The Nigeria society, especially parents and guardians of students as well as students themselves should change and learn how to give due recognition and respect to the worth of teachers
3. The result of the analysis shows that teachers teaching techniques and classroom control ability affect students' achievement. Therefore, teachers without teaching qualification should be encouraged to go for courses in education in order to acquire adequate method of passing instruction to students
4. Finally, government should give immediate recognition to teaching as a profession. This would raise the quality of people coming into the profession. Appointment of professional teacher into government positions must be encouraged. Some specific posts should be restricted to practicing teachers for instance; commissioner for education at any state should be for a practicing classroom teacher.

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Table 1: Summary of Regressions Analysis

R	R. Square	Adjusted R. Square	Std Error of the Estimate
225a	0.051	0.044	16.00

Table 2: Analysis of Variance

Source of Variance	Sum of Squares	df	Means Square	F	Sig. (P)
Regression	11869.823	6	1978.304	7.732	0.000*
Residual	221832.0	867	255.862		
Total	233701.8	873			

*Significant at P < 0.05

Table 3: Relative Effects of the Six Teacher Quality factors on Students Achievement in Mathematics

Variables	Unstandardized coefficients		Standard coefficients		Rank	
	B	Std Error	Beta	T	S	
Constant	14.114	7.900		1.786	0.74	
Experience	6.262E-02	259	0.011	6 th	0.242	0.809
Qualification	0.534	404	0.062	5 th	1.322	0.187
Motivation	1.434	417	0.150	2 nd	-3.437	0.001*
Interest/Satisfaction	2.803	518	0.224	1 st	5.435	0.000*
Teaching Techniques	1.706	492	0.128	3 rd	3.467	0.001*
Classroom Control	0.849	0.362	0.089	4 th	-2.346	0.019*

* Significant at P < 0.05

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