

# TEACHERS QUALITIES AND SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN MATHEMATICS

**Bright Ihechukwu Nwoke, Ph.D**

*Department of Mathematics,  
Alvan Ikoku Federal College of Education,  
Owerri*

*And*

**Fiokedu Sam Okorie .Ph.D**

*Faculty of Education,  
Akwa Ibom State University,  
Uyo*

## **Abstract**

*The study was carried out to determine the influence of teachers' quality on secondary school students' achievement in mathematics in owerri Education zone of Imo state. The descriptive survey research design was adopted in carrying out the study. A total sample size of 105 mathematics teachers participated on the study. The data required for the study was collected through a researcher made questionnaire instrument titled "Teacher Qualities and Student Achievement in Mathematics" (TQSAM). It had a reliability coefficient of 0.72 determined through crounbach's alpha method. The data generated was analyzed using mean, standard deviation, chi-square and t-test statistical tools tested at 0.05 level of significance. The study revealed a significant relationship between teachers' qualities and students' achievement in mathematics. Based on the findings it was recommended that qualified teachers with required degree and qualities be employed to teach mathematics in secondary schools.*

**Key words:** *teachers, qualities, students, achievement in mathematics.*

The quality of mathematics teachers has been seen as a critical issue in terms of students' achievement. Research has shown that students' achievement is more heavily influenced by teachers' quality than students characteristics. For instance, Sanders(1998) states that, the single largest factor affecting academic growth of population of students is differences in effectiveness of individual classroom teacher. School inputs make little difference in students learning, a growing body of research suggests that schools can make a difference, and a substantial portion of that difference is attributed to teachers (Darling-Hammond 2000). Hughes (2003) and Wenglnsky

## ***Bright Ihechukwu Nwoke, Ph.D and Fiokedu Sam Okorie .Ph.D***

---

(2004) noted that, disparities in mathematics achievement have been evident in assessment scores, course enrollment patterns, and allocation of human and material resources. Variations in achievement correlate with variations in course enrollment patterns and resources. That is, students who have access to advance mathematics courses, taught by a highly qualified teacher (human resources) and who have access to adequate material resources show stronger achievement in mathematics than their peers. Lee and Fradd (1996) posited that the teacher is the primary factor in school and much depends on him to promote students' high order thinking skills which are required for academic success. CPE (2008) noted that, the benefits associated with being taught by good teachers are cumulative. The achievement gap widens each year between students with most effective teachers and those with least effective teachers. These suggest that, the most significant gains in students achievement will likely be realized when students receive instruction from good teachers over consecutive years. Many students produce the most gains when assigned to effective teachers which implies that, lack of good teachers is a major contribution to the achievement gap. According to Clotfelter, Ladd and Vigdor (2010) the achievement gap between more and less advantaged student can be attributed in part to the inequitable distribution of teachers across schools.

Adeogun (2003) noted that, the quality of the education system depends on the quality of teachers and a school without resources, it is impossible to achieve the goals and objectives of the education system. According to Adesina (1981) teachers are the primary indicator and determinants of the quality of education. According to Kimani, Augustin and Njagi (2013) it has been proved that, teachers have an important influence on students' academic achievement. Afe in Kimani, etal (2013) noted that, they play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into action and principles based on practice during interaction with the student. Sabity and Nuradeen (2010) opined that, the success of any teaching and learning process which invariably influences students' academic performance depends on how effective and efficient the teachers are. Teachers who are the personnel in-charge of teaching and implementing educational policies designed to attain educational goals cannot be rejected.

Several studies have found a relationship between teachers quality, for instance, Greenbery, Genshalt and Hamachek (2004) in their study found that, teachers certification and teacher experience were strongly associated with higher students' achievement in mathematics. Olaleye (2013) noted that, the ability to teach effectively depends on the knowledge of the teachers and that knowledge exists in many forms. Teachers' effectiveness will be hampered if the teachers are not familiar with the body of knowledge that is taught. Teachers who master the material will pass a language more clearly and provide better explanations than those with weaker background. Bangbade (2004) discovered that, teachers attributes have significant relationship with

### *Teachers Qualities And Secondary School Students' Achievement In Mathematics*

---

students' academic performance such attributes include, teachers' knowledge of the subject matter, communication ability emotional stability, good human relationship and interest in the job. He concluded that students whose teachers lack the knowledge of the subject matter, who have poor communication ability, poor emotional stability and lack interest in the job do not perform like others whose teachers possess these attributes. Monk and king (1994) demonstrated that, each additional course a teacher has taken in mathematics improves student mathematics achievement by about three quarters of one percent of a standard deviation. Also teachers who teach subjects that they have previously studied indepth are particularly effective. Denton and Lacina (1984) found positive relationships between the extent of teachers' professional education coursework and their teaching performance, including their students' achievement. Byrne (1983) suggested that, a teacher's knowledge provides the basis for his or her effectiveness, the most relevant knowledge will be that which concerns the particular topic being taught and the relevant pedagogical strategies for teaching it to the particular type of pupils to whom it will be taught. Goldhaber and Brewer (2000) in a study found that, fully certified teachers have a statistically significant positive impact on student test scores relative to teachers who are not certified in their subject area, as do teachers who hold a degree in mathematics or mathematics education. Yala and Wanjohi (2011) and Adeyemi (2010) found that teachers' experience and educational qualifications were the prime predictors of students' academic achievement. However Riykin, Hanushek, and Kain, (2005) found that, teachers teaching experience and educational qualifications were not significantly related to students' achievement.

It is still not specific which qualities of mathematics teachers relate strongly with student achievement which has given reason for the present study.

#### **Statement of the Problem**

Mathematics is a strong determinant of any nations development and the queen of the sciences and technological development. However students' performance in this all important subject has continued to be poor. Ahiakwo (2006) in a study reported that the performances of variety levels of students in mathematics have decelerated over the years with that of Nigerian students quite remarkable. At every instance, accusing fingers are always pointed at the quality of mathematics teachers as they are involved in impacting knowledge.

This study was carried out to determine the relationship between teachers qualities and secondary school students achievement in mathematics in Imo state.

#### **Purpose of the Study**

The main purpose of this study is to determine the relationship that exists between mathematics teachers qualities and students achievement. Specifically the study will determine;

## ***Bright Ihechukwu Nwoke, Ph.D and Fiokedu Sam Okorie .Ph.D***

---

- Teachers perception of qualities that reflect on students achievement in mathematics
- The difference in the perceptions of male and female teachers on teachers qualities that reflect on students achievement in mathematics

### **Research Questions**

The following research questions guided the study

1. What are teachers' qualities that influence secondary school students' achievement in mathematics?
2. What is the difference in the perception of male and female teachers on qualities that influence secondary school students' achievement in mathematics?

### **Hypotheses**

The following hypotheses were posited for the study:

1. There is no significant relationship between teachers' qualities and secondary school students' achievement in mathematics.
2. There is no significant difference between the mean responses of male and female teachers on teachers' qualities and secondary school students' achievement in mathematics.

### **Methodology**

The study was a descriptive survey type employed as to determine the qualities of mathematics teachers that influence achievement.

A sample of 105 mathematics teachers was randomly selected from the total population of 235 mathematics teachers in secondary schools in Owerri Education zone of Imo state. It consists of males 60 and 45 females. The instrument used for data collection was a researcher made likert scale questionnaire of 4-points type (strongly agree(4), agree(3), disagree(2) and strongly disagree(1)) titled "Teacher Qualities and Students Achievement in Mathematics (TQSAM). The face and content validity of the instrument was determined by two mathematics education and a measurement and evaluation expert. Their inputs guided the correction of the instrument where necessary. The instrument had reliability coefficient of 0.72 determined through Cronbach's alpha method.

The instrument was administered to the teachers and they were returned after two days this was to allow them make proper decision while filling them.

The data generated was analyzed using mean and standard deviation (for answering research questions). Any item mean within 2.50 and above was accepted as a factor

*Teachers Qualities And Secondary School Students' Achievement In Mathematics*

while any below was rejected. The hypotheses were tested using t-test and chi-square statistical tools tested at 0.05 level of significance.

**Result**

**Research Question 1:** what are teachers' qualities that influence secondary school students' achievement in mathematics?

**Table 1: Teachers' Perceptions of Qualities That Influence Students Achievement in Mathematics.**

S/N	Items	Males		Females		Decision
		Mean	S.D	Mean	S.D	
1	Mathematics teachers cognate experience influences students achievement	2.82	0.94	2.80	1.00	Accept
2	Teachers ability to vary instructional strategies enhances students achievement in mathematics.	2.73	0.91	2.80	0.92	Accept
3	Teachers level of qualification in the subject area influence students achievement in mathematics.	2.91	1.00	2.85	1.01	Accept
4	Teacher students relationship influences students achievement in mathematics.	2.70	1.00	2.65	0.92	Accept
5	Teachers gender influences student achievement in mathematics	2.40	0.90	2.35	0.91	Reject
6	Teachers mathematical content knowledge influences students achievement in mathematics.	2.92	1.02	3.00	1.00	Accept
7	Mathematics teachers communication skills influences students achievement in mathematics.	2.65	0.95	2.71	0.94	Accept
8	Teachers attitude towards teaching of mathematics influences students achievement in mathematics.	2.75	1.00	2.60	0.94	Accept
9	Teachers ability to sequence topic influences student achievement in mathematics.	2.52	0.92	2.55	0.96	Accept
10	Teachers time management ability enhances students achievement in mathematics.	2.20	0.87	2.30	0.90	Reject
11	Teachers preparation before lessons influences students achievement in mathematics.	2.65	1.00	2.58	0.96	Accept
12	Mathematics teachers in-service trainings influence students achievement in mathematics.	2.82	0.95	2.63	0.94	Accept

***Bright Ihechukwu Nwoke, Ph.D and Fiokedu Sam Okorie .Ph.D***

Table 1 shows that items 5 & 10 (gender & time) were rejected as teachers qualities that influence secondary school student achievement in mathematics. However all other items (1,2,3,4,5,6,7,8,9,10,11,12) were accepted since they had response mean of 2.50 and above.

**Research Question 2:** what is the difference in mean perception of male and female teachers’ qualities that influence secondary school students achievement in mathematics?

**Table 2: Summary of Male and Female Teachers Mean Responses**

Teachers	N	Mean	SD	Mean Diff.
Males	60	2.67	0.95	0.02
Female	45	2.65	0.94	

Table 2 shows that a difference of 0.02 exists between the mean response of male and female teachers on teachers qualities and students achievement in mathematics in favour of male teachers.

**HO<sub>1</sub>:** There is no significant relationship between teachers qualities and students achievement in mathematics in secondary schools.

**Table 3: Summary of Chi Square(X<sup>2</sup>) Analysis on Teachers Qualities and Students Achievement**

s/n	Items	Agree	Disagree	Total
1	Mathematics teachers cognate experience influences students achievement	75 (78.58) 0.163	30 (26.42) 0.486	105
2	Teachers ability to vary instructional strategies enhances students achievement in mathematics.	80 (78.58) 0.026	25 (26.42) 0.076	105
3	Teachers level of qualities action in the subject area influence students achievement in mathematics.	82 (78.58) 0.149	23 (26.42) 0.442	105
4	Teacher students relationship influences students achievement in mathematics	91 (78.58) 1.962	14 (26.42) 5.836	105
5	Teachers gender influences student achievement in mathematics	65 (78.58) 2.348	40 (26.42) 6.984	105
6	Teachers mathematical content knowledge influences students achievement in mathematics	95 (78.58) 3.430	10 (26.42) 10.202	105
7	Mathematics teachers communication skills	78	27	105

**Teachers Qualities And Secondary School Students' Achievement In Mathematics**

	influences students achievement in mathematics	(78.58) 0.004	(26.42) 0.013	
8	Teachers attitude towards teaching of mathematics influences students achievement in mathematics.	77 (78.58) 0.032	28 (26.42) 0.095	105
9	Teachers ability to sequence topic influences student achievement in mathematics.	71 (78.58) 0.732	34 (26.42) 2.177	105
10	Teachers time management ability enhances students achievement in mathematics.	68 (78.58) 1.425	37 (26.42) 4.240	105
11	Teachers preparation before lessons influences students achievement in mathematics.	73 (78.58) 0.397	32 (26.42) 1.180	105
12	Mathematics teachers in-service trainings influence students achievement in mathematics.	88 (78.58) 1.128	17 (26.42) 3.357	105
<b>TOTAL</b>		<b>943</b>	<b>317</b>	<b>1260</b>

Chi-sq( $x^2$ )= **46.884**, DF=11, p-value=0.000

In table 3, expected counts (figures in brackets) are printed below observed counts. Chi square ( $x^2$ ) contributions are printed below expected counts. The result shows that the p-value 0.000 is less than 0.05 ( $p < 0.05$ ) also, the calculated chi-square value (46.884) is greater than the table value (19.675) at degree of freedom 11 and 0.05 level of significance. Based on the result the null hypothesis is rejected and the alternative accepted at 0.05 level of significance. This implies that, there is a significant relationship between teachers' qualities and secondary school students' achievement in mathematics.

**HO<sub>2</sub>** : There is no significant difference between the mean responses of male and female teachers on qualities and students achievement in mathematics in secondary schools.

**Table 4: Summary of T-Test Analysis of Male and Female Teachers Responses**

Teachers	N	Mean	SD	DF	t-cal	t-0.05	Decision
Male	60	2.67	0.95	103	0.10	1.65	sig
Female	45	2.65	0.94				

Table 4: shows that t- calculated value(0.10) is less than table value (1.65) at 0.05 levels of significance and based on the result, the null hypothesis is upheld at 0.05 level of significance difference. This implies that, no significant difference exist between the mean responses of male and female teachers on teachers qualities and student achievement in mathematics.

### **Discussion**

The result of the study revealed that teachers qualities such as, qualifications, experiences, training, communication skills, instructional method, teacher- student relationship, mathematical contact knowledge, attitude, topic sequencing pattern and preparation influences students achievement in mathematics. However, Gender of teacher and time management were not seen to influence the students' achievement. These factors showed strong relationship with student achievement in mathematics in secondary school. This result is in line with the findings of Daso (2013), Bangbade (2003) Adeyemi (2010) which showed significant relationship between teachers' qualities and students' achievement in mathematics. The opinion of teacher on teachers' qualities and student achievement in mathematics cuts across gender as male and female teachers had difference in their responses.

### **Conclusion**

The study showed that teacher quality has a great influence on students' achievement in mathematics in secondary schools and they are the major stake holder in teaching and learning of mathematics.

### **Recommendations**

Based on the findings, the following recommendations are made:

1. Only qualified teachers of mathematics should be employed to teach mathematics in secondary schools.
2. Those who are already employed should always update their knowledge and skills through further training, workshops and seminars.
3. Teachers who exhibit good qualities should be encouraged through rewards as to further build their interest and committing to the teaching profession.

### **References**

- Adeogun, A.A. (2003) *Economics of education*. Lagos: Olatunji Publishers.
- Adesina,S.(1981). *Some aspects of school management*. Ibadan :Board publications.
- Adeyemi,T.O. (2010). Teacher related factors as correlates of pupils' achievement in social studies in south-west Nigeria. *Electronic Journal of Research in Educational Psychology*, 8(1) 313-332.
- Ahiakwo, M.J. (2006). Science, education and scientific literacy. *Inaugural professoral lecture series, No 17.4*
- Bangbade, J.O. (2004) Effect of subject matter knowledge in the teaching and learning of biology and physics. *Teaching and Teacher Education* 102-109.

***Teachers Qualities And Secondary School Students' Achievement In Mathematics***

---

- Byrne, C.J. (1983). Teacher knowledge and teacher effectiveness. *A literature review, theatrical paper presented at the meeting of the North-western Educational Research Association*. New York.
- Clotfelter, C. Ladd, H.F & Vigor, J. (2010) .Teacher credentials and students achievement in high school. A cross- subject analysis with student fixed effect. *The Journal of Human Resources* 45 (3), 655-681.
- Darling-Hammond. L. (2000). Teacher quality and student achievement. A review of state policy Evidence. *Journal of Teacher Education* 8(1),1-44.
- Daso, P.O. (2013). School variables and senior secondary students' achievement in mathematics in rivers state, Nigeria. *Mediterranean Journal of Social Sciences*, 4 (2),709-718 .
- Denton, J.J, & Iacina, L.J. (1984). Quality of professional education coursework linked with process measures of student teaching. *Teacher Education and Practice*, 39-64,
- Goldhaber, D. & Brewer, D. (2000). Does teacher certification matter? High school teacher certification status and student achievement. *Educational Evaluation and Policy Analysis*, 22 (2), 129-145.
- Greenberg,I. Genshatt,, W., & Hamachek,K. (2004). Teach quality measures and students' achievement in mathematics. *Research Brief*, 2(15), 1-2.
- Highes, S.A. (2003). An early gap in black-white mathematics achievement holding school and home accountable in affluent city school district. *The urban Review*, 35(4), 297-322.
- Lee, M.K, & Fradd,s. (1996). *Effective schools in mathematics and science teaching*. Boston.
- Centre for Public Education (2008). Teacher quality and student achievement. *Retried on 10/10/2014 from [http:1/www.education.com/ref](http://www.education.com/ref)*.
- Monk, D.H & King J. (1994). Multi- level teacher resources effects on pupils performance in secondary mathematics and science the role of teacher subject matter preparation in R.G Ehrenbery (ed.) *Contemporary policy issues. Choices and consequences in education*. Ithaca, NY: ILR press.

***Bright Ihechukwu Nwoke, Ph.D and Fiokedu Sam Okorie .Ph.D***

---

- Olaleye, F.O. (2011). Teachers' characteristics and predictor of academic performance of students in secondary schools in Osun state- Nigeria. *European journal of educational studies*, 3(3), 505-511.
- Rivkin, S.G., Hanushek, E.A. & Kain, J.F. (2005). Teachers, school and academic achievement. Retrieved on 10/01/2014 from <http://www.utdallas.edu/research/esp/publications.htm>.
- Sabitu, A.O & Nuradeen, B.B. (2010). Teachers attributes as correlates of students' academic performance in geography in secondary schools in ondo state, Nigeria *Medwell Journals* 7(5), 388-392.
- Sanders, W.L. (1998). Value added assessment. *School Administration*, 11(55), 24-27.
- Wenglinsky,H. (2004) . Closing the racial achievement gap the role of reforming instructional practices. *Education Policy Analysis Archives*, 12(64), 32-45.
- Yala, R.O.& Wanjohi, W.C. (2011). Performance determination of KCSE in mathematics in secondary schools in Nyanira division Kenya. *Asian Social Science*, 7(23:107-112).