

## Impact of Teacher Characteristics on Student Academic Achievement in Kisumu Central Sub-County, Kenya

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### Abstract.

*The purpose of the study was to establish the contributions of teacher characteristics to academic achievement of the 2010 public day secondary school cohort. The study was guided by Education Production Function. The production function is used to explain the relationship between inputs and outputs of a firm. Education Production Function (EPF) indicates that educational outcomes are a function of various variables that are employed into the education process. The study was conducted in Kisumu Central Sub-County, Kenya. The target population was 11 public secondary schools. Saturated sampling method was used. 11 principals and 289 teachers formed the sample. Ex-post facto research design was used. Questionnaires were used to collect data from schools. Data analysis was done using descriptive statistics. Two variables, teacher qualification and teacher experience indicated no significant relationship with student academic achievement.*

**Keywords:** Academic Achievement, Teacher Remuneration, Teacher Qualification, Teacher Age, Teacher Experience.

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### Introduction

Because of increased emphasis on high stakes testing, teacher characteristics have traditionally been measured through student outcomes such as test scores (Stumbo and Mc Walters, 2010). According to Ndebbio (2000), formal education is result-evaluation oriented and as such every learner needs to achieve goals in life because of social approval of success or punishment for failure. Maximization of returns on investment and achieving the best results are the concern of all stakeholders in education. There is need to assess some teacher characteristics and their contributions to student academic achievement.

### Teacher Qualification and Academic Performance

It is generally acknowledged that promoting teacher quality is a key element in improving primary and secondary school education and one primary goal in education is to have a highly qualified teacher in every classroom (Harris and Sass, 2008). Education, according to Kharshud (2008) education is broad term, the life long process of acquiring knowledge and skills through both formal and informal exposure to information, ideas and experiences. To impart knowledge, teacher plays pivotal role towards the student learning. Gilbert (2013) asserts that a lot of teaching is experience not training and therefore content knowledge is not the key to successful teaching and therefore concludes that there is no correlation between academic performance and good teaching except in high school courses.

According to Karpati (2009), studies conducted in 25 countries in Europe concluded that teacher quality is the most important factor in an education system and the second most important factor (only preceded by family background) among the variety of influence affecting student achievement and further remarks that an education system cannot exceed the quality of its teachers. Studies conducted in Florida, U.S.A on teacher training, quality and Student Achievement in Mathematics found out that content-focused teacher professional development is positively associated with productivity in middle and high school mathematics (Harris and Sass, 2008). In Bangladesh, studies carried out in city secondary schools found out significant impact of some teachers professional development activities on school result improvement (Enamul, Gazi, and Kanesean, 2011). Pre-service teacher training and having a Master's level qualification together raises student achievement by about one-fifth of a standard deviation – thus a small, but statistically significant effect (Kingdon, 2006). This was the outcome of a study conducted in India on whether teacher certification and higher pay improves student performance. Olatunji and Nuvadeen's (2010) study in Ondo State, Nigeria concluded that there is positive relationship between teachers attributes and students' academic performance in Geography measured in terms of knowledge of subject matter, communication ability, and interest in the job and student academic achievement.

In Kenya, studies conducted by Agwanda (2002) on Student Achievement in National Examinations in Kisumu Municipality concluded that teacher qualification had positive correlation with student performance. The analysis showed that the higher the percentage of qualified teachers, the higher the candidates' scores in examinations. Yara and Otieno's (2010) study on academic achievement in mathematics in secondary schools in Bondo District concluded that performance in mathematics was below average and cited the inadequate in-service to teachers of mathematics as the main cause of the situation

### **Teacher Experience and Academic Achievement**

Buddin, Zimmer, Chau, Gill and Hamilton (2009) puts it that teacher effectiveness is typically measured by traditional teacher qualification standards such as experience, education, scores in examination at pre-service training institutions. Studies in Los Angeles in Mathematics and reading in secondary schools for 5 years found no evidence that traditional measure of teacher effectiveness such as training, experience, education and scores on licencure examinations have any direct connections with students' achievement. Studies found out that teacher experience effected student achievement by less than one percentage point. Harris and Sass (2007) concluded that of all the teacher characteristics there is good evidence that teachers gain in effectiveness with additional years on the job. Rice (2010) opined that teacher experience is strongest during the first few years of teaching; after that, marginal returns diminish Clotfelter, Ladd and Vigdor (2007) concluded that teachers with more experience are better teachers. This is the case even after accounting for the fact that teachers who remain teachers may, on average, be less effective than those who leave. The benefit of experience peaks 21-27 years of teaching and adds 0.092 - 0.119 standard deviation to student achievement scores. More than half of that gain occurs during the first years of teaching. Sureiman (2010) in studies on "Determinants of Academic Performance in Public Day Secondary Schools in Nandi District", Kenya revealed that teachers' experience among other variables has a significant impact on academic performance of a child while Kimani, Kara and Njagi (2013) established that teacher features such as age, experience, gender, professional qualification were not significantly related to academic achievement.

### **Teacher Remuneration**

Studies on incentives and academic achievement in New York City Public Schools concluded that there is no evidence that teacher incentives increased student performance, attendance or graduation (Fryer, 2011). If anything, teacher incentives may decrease student achievement especially in larger schools. Studies in US by the year 2000 showed that there was positive correlation between student test scores and financial incentives systems that reward individual teachers (Figilio and Kenny, 2011). According to Woesmann (2010), the use of teacher salary adjustments for outstanding performances is significantly associated with Science, Mathematics and reading achievement across countries. Countries with performance-related pay are about one quarter standard deviations higher. Muriladharan and Sundaravaman (2011) investigated the effect of individual and group incentives in 300 schools in Pradesh, India, and found that individuals and group incentives increased student achievement in both language and mathematics. Studies in Canada Schools opined that in order to improve quality of education in Canada, teachers should be paid according to the academic success of their students instead of the number of years they have been teaching (Clifton, 2013). These studies showed that teachers with more education and more experienced are paid more than teachers with less education and less experience, even if they are doing the same job and even if the lower paid teacher is more effective in the classroom. There is a growing demand from Kenyan government, educators, parents and public for teacher accountability. Teachers cannot be disassociated from schools they teach and academic results of schools (Heck, 2009; Lydia and Nasongo, 2009; Yusuf and Adegun, 2010).

Winters, Ritter, Mash, Holley and Greene (2008) put it that there is need for understanding of the impact of teacher effort in the educational production process. Kimani et al (2013) observes that student achievement is produced by several inputs in the process. The inputs include but not limited to family background characteristics, class size, teaching and learning materials and teacher characteristics among others. The teacher as an input is the principal factor in education provision and thus affects the quality of education in a significant way. Teacher factors have an effect on academic achievement and examination results depend on the extent to which teachers effectively use the inputs to improve teaching and learning process.

In view of these conflicting findings and views, this study investigated the relationship between selected teacher characteristics and student academic achievement in Kisumu Central Sub-County, Kenya. According to Ministry of Education Science and Technology (MoEST), it is logical to use standardized students' assessment results as the basis for judging performance of teachers (MoEST, 2002). Kenya Certificate of Secondary Education (KCSE) result of 2013 candidates was used to analyze academic achievement of students and therefore the contribution of teachers.

### **Methodology**

#### **To Objectives of the Study**

- (i) To investigate the relationship between teacher qualification and student academic achievement.
- (ii) To find out the contributions of teacher experience on student academic achievement.
- (iii) To establish the relationship between teacher remuneration and student academic achievement.
- (iv) To find out the contribution of teacher age to student academic achievement.

### **Hypotheses of the Study.**

- (i) There is no significant relationship between teacher qualification and student academic achievement.
- (ii) There is no significant relationship between teacher experience and student academic achievement.
- (iii) There is no significant relationship between teacher remuneration and student academic achievement.
- (iv) There is no significant relationship between teacher age and student academic achievement.

### **Research Design**

The research design for the study is descriptive survey design of the *ex-post facto* type. This is because the researcher will not be able to manipulate the variables because they have already occurred. Education Production Function theory which indicates that educational outcomes are a factor of various inputs that are employed into the education process was used in data analysis. The variables in the study included teacher age, teacher qualification, teacher remuneration and teacher experience while the dependent variable was KCSE results. Multiple correlations were used to show the extent to which the variables affect student performance. The study was carried out in Kisumu Central Sub-County, Kenya. The sub-county is located in Kisumu City.

### **Population and Sampling procedure**

The total number of public secondary schools in Kisumu Central Sub-County is 11. Those that had prepared candidates for KCSE in the year 2013 are 11. Saturated sampling method was used because the schools are located within a small confinement (10 km<sup>2</sup>). The research respondents for the study were the principals and teachers in the sampled schools. The research instrument used was a questionnaire for principals and for teachers. The questionnaire had items on teacher remuneration, teacher age, teacher qualification, teacher experience and KCSE result. The researcher personally administered the questionnaires.

### **Result**

#### **KCSE 2013 Summary**

**Table 1: Distribution of schools by KCSE MEAN and Number of teachers**

| <b>School</b> | <b>KCSE MEAN</b> | <b>Number of teachers</b> | <b>Percentage</b> |
|---------------|------------------|---------------------------|-------------------|
| i             | 8.925            | 14                        | 4.8               |
| ii            | 9.342            | 51                        | 17.6              |
| iii           | 7.324            | 38                        | 13.1              |
| iv            | 5.227            | 52                        | 18.0              |
| v             | 4.365            | 36                        | 12.5              |
| vi            | 6.462            | 17                        | 5.9               |
| vii           | 3.880            | 15                        | 5.2               |
| viii          | 7.000            | 11                        | 3.8               |
| ix            | 4.958            | 16                        | 5.5               |
| x             | 6.194            | 24                        | 8.3               |
| xi            | 7.040            | 15                        | 5.2               |
| <b>Total</b>  | <b>Total</b>     | <b>289</b>                | <b>100.0</b>      |

The information in table 1 shows that the school that had the highest number of teachers (51) had the highest mean score (9.342/12). On the contrary, the lowest mean score (3.880/12) in KCSE was scored by the school with 15 teachers. The school with the least number of teachers (11) scored a mean grade of 7.000/12 which is above average (6.000/12).

**Table 2: Correlations**

|                       |                     | Teacher qualification | Teacher experience | Teacher salary | Teacher age | KCSE MEAN |
|-----------------------|---------------------|-----------------------|--------------------|----------------|-------------|-----------|
| Teacher qualification | Pearson Correlation | 1                     | .574**             | .687**         | .699**      | .010      |
|                       | Sig. (2-tailed)     |                       | .000               | .000           | .000        | .865      |
|                       | N                   | 289                   | 289                | 289            | 289         | 289       |
| Teacher experience    | Pearson Correlation | .574**                | 1                  | .717**         | .702**      | .009      |
|                       | Sig. (2-tailed)     | .000                  |                    | .000           | .000        | .884      |
|                       | N                   | 289                   | 289                | 289            | 289         | 289       |
| Teacher salary        | Pearson Correlation | .687**                | .717**             | 1              | .821**      | .092      |
|                       | Sig. (2-tailed)     | .000                  | .000               |                | .000        | .118      |
|                       | N                   | 289                   | 289                | 289            | 289         | 289       |
| Teacher age           | Pearson Correlation | .699**                | .702**             | .821**         | 1           | -.117*    |
|                       | Sig. (2-tailed)     | .000                  | .000               | .000           |             | .047      |
|                       | N                   | 289                   | 289                | 289            | 289         | 289       |
| KCSE MEAN             | Pearson Correlation | .010                  | .009               | .092           | -.117*      | 1         |
|                       | Sig. (2-tailed)     | .865                  | .884               | .118           | .047        |           |
|                       | N                   | 289                   | 289                | 289            | 289         | 289       |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### **Relationship between teacher qualification and student academic achievement**

**Table 3: Distribution of teachers by qualification**

| Teacher qualification | Frequency | Percent |
|-----------------------|-----------|---------|
| ATS/DIP               | 62        | 21.5    |
| B.ED/PGDE             | 178       | 61.6    |
| AG.ED                 | 26        | 9.0     |
| M.ED                  | 18        | 6.2     |
| U.T                   | 5         | 1.7     |
| Total                 | 289       | 100.0   |

The first objective was to investigate the relationship between teacher qualification and student academic achievement. The records shown in table 3 depict that bachelor of education Science/Arts who have undertaken a postgraduate course in education are the

majority (61.6%) in schools in Kisumu Central Sub- County. There are very few (1.7%) untrained teachers in the sub-county. The information in table 2 above indicates that there is very low (0.010) correlation between teacher qualification and academic achievement. Correlation between teacher qualification and teacher age is very strong (0.699).

### Hypothesis one

**There is no significant relationship between teacher qualification and student academic achievement.**

**Table 4: Coefficients<sup>a</sup>**

| Model                 | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-----------------------|-----------------------------|------------|---------------------------|--------|------|
|                       | B                           | Std. Error | Beta                      |        |      |
| (Constant)            | 5.278                       | .564       |                           | 9.365  | .000 |
| Teacher qualification | .220                        | .329       | .054                      | .668   | .504 |
| Teacher experience    | .039                        | .193       | .017                      | .204   | .839 |
| Teacher salary        | 1.092                       | .212       | .550                      | 5.155  | .000 |
| Teacher age           | -2.097                      | .360       | -.618                     | -5.830 | .000 |

a. Dependent Variable: KCSE MEAN

The result in table 4 shows that; Beta = 0.054, t = 0.668, p = 0.504.

$P > 0.05$ , hence the null hypothesis is accepted. There is no significant relationship between teacher qualification and academic achievement.

### Contributions of teacher experience on student academic achievement

**Table 5: Distribution of teachers by experience**

| Teacher experience | Frequency | Percent |
|--------------------|-----------|---------|
| Less than 3 years  | 36        | 12.5    |
| 3 - 9 years        | 58        | 20.1    |
| 10 - 15 years      | 42        | 14.5    |
| 16 - 26 years      | 70        | 24.2    |
| 22 - 27 years      | 69        | 23.9    |
| 28 and above       | 14        | 4.8     |
| Total              | 289       | 100.0   |

The second objective of the study was to find out the contributions of teacher experience on student academic achievement. Information in table 5 shows that majority (24.2%) of teachers in the sub-county have a working experience of 16-26 years. Those with teaching experience above 28 years are very few (4.8%). Table 2 above indicates that the relationship between teacher experience and academic achievement is low (0.009). The correlation between teacher experience and teacher salary is very strong (0.717).

### Hypothesis two

**There is no significant relationship between teacher experience and student academic achievement.**

The result shown in table 4 above shows that; Beta = 0.017, t = 0.204, p = 0.839.

$P > 0.05$  hence accept null hypothesis. There is no significant relationship between teacher experience and academic achievement.

### **Relationship between teacher remuneration and student academic achievement**

**Table 6: Teachers' distribution by gross salary**

| Teacher salary         | Frequency | Percent |
|------------------------|-----------|---------|
| Less than kshs 30, 000 | 17        | 5.9     |
| Kshs 31, 000 - 40, 000 | 35        | 12.1    |
| 41, 000 - 50,000       | 51        | 17.6    |
| 51,000 - 60,000        | 65        | 22.5    |
| 61, 000 - 70, 000      | 45        | 15.6    |
| 71,000 - 80, 000       | 50        | 17.3    |
| 81, 000 - 90, 000      | 20        | 6.9     |
| 91, 000 and above      | 6         | 2.1     |
| Total                  | 289       | 100.0   |

The third objective of the study was to establish the relationship between teacher remuneration and student academic achievement. Table 6 shows that 22.5% of the teachers in Kisumu Central Sub-County earn a gross salary of between ksh. 51,000-60,000 while the number earning above ksh. 91,000 were only 21%. Table 2 above indicates that the relationship between teacher salary and academic achievement is low (0.092). The correlation between teacher salary and teacher age is very strong (0.821).

### **Hypothesis three**

**There is no significant relationship between teacher remuneration and student academic achievement.**

Table 4 above shows that; Beta = 0.550,  $t = 5.155$ ,  $p = 0.001$ .  $p < 0.005$  meaning that the null hypothesis is rejected. There is significant relationship between teacher salary and academic achievement.

### **Contributions of teacher age to student academic achievement.**

**Table 7: Teacher age**

| Teacher age   | Frequency | Percent |
|---------------|-----------|---------|
| 23 - 30 years | 39        | 13.5    |
| 31 - 38 years | 104       | 36.0    |
| 39 - 46 years | 81        | 28.0    |
| 47 - 54 years | 61        | 21.1    |
| 55 and above  | 4         | 1.4     |
| Total         | 289       | 100.0   |

The fourth objective was to find out the contribution of teacher age to student academic achievement. The information in table 7 shows that majority of the teachers (36.0%) are aged between 31-38years while 1.4% are aged 55 years and above. Table 6 indicates that the relationship between teacher age and academic achievement is low (-0.117). This signifies that the lower the teacher age, the better the examination results. The correlation between teacher age and teacher experience is very strong (0.702).

### **Hypothesis four**

**There is no significant relationship between teacher age and student academic achievement.**

From table 4 above, Beta = -0.618, t = -5.830, p = 0.001.  $p < 0.05$ . Reject the null hypothesis. There is significant relationship between teacher age and academic achievement. The negative correlation points that the lower the age of a teacher the more the effectiveness in curriculum delivery.

**Table 8: Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .352 <sup>a</sup> | .124     | .112              | 3.222                      |

a. Predictors: (Constant), Teacher age, Teacher qualification, Teacher experience, Teacher salary

Information in table 8 shows the outcome of linear regression that was used to test the relationship between the four teacher characteristics and academic achievement. The results summarized in the table show regression statistics, R-value of 0.352 and an adjusted R<sup>2</sup> of 0.112 which shows that only 11.2% in the variance in academic achievement in the schools is accounted for by teacher experience, remuneration, age and training.

### Conclusion

The school with the highest number of teachers (51) recorded the highest mean score (9.342/12) in KCSE. This could probably be caused by reduced work load on the teachers. This enables the teachers to prepare adequately for service delivery. The study reveals that teacher qualification does not play pivotal role in determining student academic achievement. Other factors such as socio-economic background of a student, availability of resources, among others come into play to affect academic achievement of a student. The correlation between teacher salary and teacher age is very strong (0.821). Only 11.2% of the variance in academic achievement in the schools is accounted for by the four teacher characteristics. The remaining percentage is accounted for by the other variables and factors not considered by the study. Two of the hypotheses were rejected. There is significant relationship between teacher salary, teacher age and academic achievement. This means that a rise in teacher remuneration (basic salary, house allowance, commuter allowance and medical allowance) leads improved motivation of teachers. This makes the teachers to perform effectively hence improvement in students' academic achievement. The study also revealed that the lower the age of teachers, the agility and efficiency with which they perform their duties.

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