Teacher Qualification and Primary School Academic Achievement in Khwisero Sub County, Kenya

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3.1 Abstract

Teachers have a crucial role in improving learning outcomes. Since quality differs by teacher, their potential impact on student outcomes may also differ. This study explored the relationship between teacher qualifications and school academic achievement in Khwisero Sub-County, Kenya. The study was carried out in Khwisero Sub County which had 61 public primary schools. The study utilized an Ex post facto research design since it allowed the researcher to investigate many relationships in a single research project. The target population comprised of all the 670 primary school teachers and head teachers in the 61 public primary schools in Khwisero Sub County. This was a census because the sub county had only 61 primary schools. Five teachers who handled the 2013 class eight candidates in each school were included in the study since there are five examinable subject areas in the Kenya Certificate of Primary Education (KCPE) examination were not directly included. Data was collected through questionnaires which were filled by the Head teachers and also document analysis was carried out on analysed KCPE 2013 results. The instruments validation exercise was done by the supervisors. Reliability of research instruments involved the use of a test-retest technique at r =0.7. Data were analyzed both descriptively(means, percentages) and inferentially The findings of the study showed that the P1 teacher, S1/Diploma teacher, Approved Teacher Status and the number of class eight streams were had an effect on the school KCPE means scores. It was recommended that the Teachers Service Commission should check on the rush for degrees by primary school teachers with the hope of better pay as this had a negative impact on the schools KCPE mean score in the Sub-County.

Key words: Teacher qualifications, academic achievements & quality assurance

3.2 Introduction

Academic performance of students in any academic task has always been of special interest to the government, educators, parents and society at large (Lydiah and Nasongo, 2009). For any society to succeed in the rapidly changing world, skilled human capital with a solid base of knowledge is essential. This "refined human capital" can only be produced by developing and sustaining education systems according to social demands (Olembo, Wanga&Karugu, 1992). For this reason, education of the young generation has become a priority in both developing and developed societies (Levin, Wasanga& Somerset, 2011). Primary education in particular is the level of education that develops an individual's capacity to read, write and calculate and in so doing helps to eradicate illiteracy, which is one of the strongest predictors of poverty (Bruns, Mingat & Rakotamalala, 2003).

Public primary schools in Khwisero Sub-County have not only been performing poorly but their performance has been unsteady. According to the Ministry of Education (2013) the Sub-County posted KCPE mean scores of 260.28, 255.94, 253.73, 255.94 and 261.98 in years 2009, 2010, 2011, 2012 and 2013 respectively with an average mean score of 257.574 within this period. This performance is low and a paltry minimum entry score for Sub-County secondary schools. Poor performance of primary schools in the Sub-County therefore is undermining students' chances of joining County and national schools. This jeopardizes learners' opportunities of joining institutions of higher learning and job placement in the future hence reducing their chances of actively participating in national development.

It has been shown that teachers have an important influence on students' academic achievement and play a crucial role in educational attainment of the school (Afe, 2001). In their study, Wright, Horn and Sanders (1997) concluded that the most important factor influencing student learning was the teacher. Muhammad and Rashid (2011) demonstrated that academic qualification, professional qualification, refresher courses

or trainings and teacher experience were the most important qualities of a teacher influence of school academic performance. Considering that teachers play a major role in the teaching and learning process there was need to examine teacher related factors that influence academic achievement. This study was therefore conceptualized establish the relationship between selected teachers' qualification factors (length of service, academic qualification and professional development) and school academic achievement in public primary schools in Kwisero Sub-County. The purpose of the Study was to establish the relationship between teachers' qualification and school academic achievement in public primary schools in Kwisero Sub-County.

3.2.1 Theoretical Framework

The theoretical framework employed in this study was that of Education Production Function (EPF). The EPF is derived from the general Production Function (PF) that is used to explain the relationship between inputs and outputs of a firm. The origin of estimating input-output relationship in schools is usually traced to the acclaimed United States Study on Equality of Opportunity commonly known as Coleman Report (1966). This report postulated that the education process is the achievement of individual student directly related to a series of inputs. This study abstracts from this function to investigate primary school academic achievement as a function of teacher qualification factors and school based factors. A simple Education Production Function would be: Q = f (A, B, …….). The education output (Q) is a function of inputs A and B where: A represents a vector of teachers qualification and B is a vector of school based factors. All these factors play a role in determining the school academic achievement (Q). This study assumes that output of an education could be simply measured in terms of the school academic mean score.

It is thus, important that teacher qualification such as teachers' length of service, teachers' academic qualification and teachers' professional development are assessed to establish their effect on schools academic achievement. This study postulates that teacher qualification factors and school based factors work independently and interdependently to influence academic achievement of primary schools in Khwisero Sub-County. Empirical assessment of this postulation involved the use of Multiple Linear Regression (MLR) Model. The model linked student's school academic achievement to teacher qualification factors and school based factors. The specific model used for empirical purposes in this study was: $y_i = \beta_0 + \beta_{1i}x_{1i} , \dots , \beta_{ki}x_{ki} + \varepsilon_i$ for i = 1,…,n; and where y_i = KCPE mean score of the i^{th} primary school; β_0=the intercept (constant); β_{1i} = the slope (Beta coefficient) for $x_{1i}x_{1i}$ = first explanatory variable that is explaining the variance in y in the i^{th} school; $\beta_{ki}x_{ki}$ = the k^{th} slope for the k^{th} explanatory variable in the i^{th} school while ε_i = error term for individual schools, assuming that the variance is constant and is independent of covariates (explanatory variables). The model summarized the functional relationships that account for academic achievement of primary schools in Khwisero Sub-County. This theoretical aspect was explained in a conceptual ideology in Figure 1.1.

3.3 Methodology

3.3.1 Research Design

The study used an ex post facto research design. An ex post facto design is used when the independent variables in the study cannot be manipulated because the presumed cause has already occurred. The use of an ex post facto research design for this study also permitted predictive relationships among variables (demographic variables viz teacher salary, overall school spending, social economic status and educational attainment) to be observed and measured.

3.3.2 Study Population

The study targeted 61 public primary schools and 670 teachers consisting of 61 head teachers, 61 deputy head teachers and 548 class room teachers of public primary schools in Khwisero Sub-County. The distribution of the study population is presented in Table 1.

Table 1: Number of Schools and Teachers by School Zone

Number	School Zone			
	Kisa North	Kisa East	Kisa Central	Total
Number of schools	26	16	19	61
Head teachers	26	16	19	61
Deputy head teachers	26	16	19	61
Classroom teachers	233	146	169	548
Total Teachers	285	178	207	670

Source: Khwisero Sub - County Education Office, 2013

3.3.3 Sample Size and Sampling Procedures

Since the Sub - County had only 61 primary schools and the unit of analysis was at school level, all the schools were to be included in the sample but only 33 primary schools were covered which was statistically acceptable because these sampling design requires at least half of the total population. The statistical technique in this case was the central limit theory because the results of the data collected involved ratios and interval data. This theory applies for at least 30 entries so that a normal distribution is achieved. The sample results reflected the entire population. For this study where only 61 primary schools are involved for a complete normal distribution as census was applicable. Five teachers who handled the 2013 class eight candidates in each school were included in this study since there were five examinable subject areas in the Kenya Certificate of Primary Education (KCPE) examination. This brings the total teacher sample size to 165. All the head teachers in the 33 primary schools were thus included in the sample in order to provide school and teacher-based variables. The study sample is presented in Table 2.

Table 2: Number of Schools, Head Teachers and Teachers Sample Size by Division

Division	Number of schools	Number of Head teachers	Number of teachers
Kisa East	10	10	50
Kisa West	23	23	115
Totals	33	33	165

Source: Study Mapping Data

3.3.4 Research Instruments

Data was collected by the use of questionnaires for all the 33 head teachers in the sampled primary schools. Questionnaires were useful research instruments because they enabled this study to obtain personal information. In addition, closed-ended questions were easier to administer because each item was followed by alternative answers. Respondents also found them easy to complete and were unlikely to be put off.

3.3.5 Data Analysis Techniques

Descriptive statistics were used to summarize the Sub- County's demographic data relating to teacher length of service, teachers academic qualification and teacher professional development. The results were presented in Tables. Multiple Linear Regression Analysis (MLRA) was used to establish the magnitude of the effect of the teachers' length of service, the teachers' academic qualification and the teachers' professional development on the school KCPE mean score in objective i, ii and iii respectively, while

controlling for school characteristics for each case. The hypotheses were tested at P< 0.05 level of significance

3.4 Results

3.4.1 Distribution of Head Teacher Respondents by School Zone

The sample size was 33 primary schools spread out in three zones in Khwisero Sub-County. Table 3 presents a summary of the distribution.

Table 3: Number of Head Teachers

School Zone	Total
KisaNorth	15
Kisa East	10
Kisa Central	8
Total	33

Source: Field data, 2014

Table 3 shows that primary schools in the sub-County are fairly distributed in the three zones with Kisa North having the highest number of schools. These schools provided the teachers information and the school mean score which was used in the analysis of the data.

3.4.2 Teachers in the Sampled Schools

The head teachers of the sampled schools were required to list all the teachers in the schools sampled. The results are summarized in Table 4.

Table 4: Number of Teachers in the Sampled Schools

Number of schools (a)	Number of teachers listed per school (b)	Number of Teachers (a*b)	%
2	7	14	4.17
1	8	8	2.38
2	9	18	5.36
24	10	240	71.43
1	11	11	3.27
3	15	45	13.39
33		336	100

Source: Field data, 2014

The researcher visited 33 out of the 62 primary schools in Khwisero Sub-County. The head teachers provided data for 336 teachers, including themselves, their deputies and senior teachers. Since student academic achievement is additive as one climbs up the ladder from class one to eight, students benefit from all teachers in the school, hence the focus on all teachers rather than just those who handled the candidate class. Three schools provided data for 15 teachers in each of those schools with the majority, 24 out of 33 (71.43), providing data for 10 teachers each. Listed teachers in each school included all teachers who had handled the 2013 KCPE candidate class.

3.4.3 Descriptive Statistics of the Variables used in the Analysis of Data

This study also established the descriptive statistics of the outcome variable, the predictor variables and the control variables. This statistics aided in understanding their distribution in terms of mean, standard deviation and range. The results are presented in Table 5.

Table 5: Descriptive Statistics for the Outcome and Explanatory Variables

Variable	Variable label	Mean	SEM	SD	Range	Min	Max
a21	School KCPE mean score (2013)	263.2	3.85	22.12	98.08	220.06	318.14
a31a	Head teachers' length of service since appointment as heads in years	9.39	0.91	5.24	20.74	1.34	22.09
a32a	Head teachers' length of service in current school as head in years	5.63	0.57	3.3	12.67	1.34	14.02
a49a	Teachers' length of service since appointment as teachers in years	14.47	0.58	3.36	17.93	2.54	20.48
a410a	Teachers' length of service in current school as teachers in years	5.84	0.36	2.074	11.41	1.62	13.04
a47	Teachers' highest completed education	13.31	0.07	0.37	1.2	13	14.2
a47a	Form 4 KCE/KCSE	0.73	0.06	0.35	1	0	1
a47b	Form 6 KACE	0.23	0.06	0.35	1	0	1
a47c	Bachelor's degree	0.04	0.01	0.08	0.27	0	0.27
a48a	Untrained teacher	0.02	0.01	0.03	0.1	0	0.1
a48b	NACECE	0.01	0	0.02	0.1	0	0.1
a48c	P2 (Primary 2)	0.01	0.01	0.05	0.3	0	0.3
a48d	P1 (Primary 1)	0.56	0.03	0.17	0.8	0.2	1
a48e	S1/Diploma (S1=Secondary 1)	0.09	0.02	0.14	0.5	0	0.5
a48f	ATS (Approved Teacher Status)	0.27	0.03	0.2	0.71	0	0.71
a48g	Graduate	0.05	0.01	0.07	0.2	0	0.2
a48h	Principal graduate	0	0	0.02	0.1	0	0.1
a23	Government school	0.97	0.03	0.17	1	0	1
a26ab	Number of TSC male teachers	6.12	0.37	2.12	10	0	10
a26bb	Number of SMB male teachers	1	0.26	1.52	8	0	8
a26ca	Number of TSC teachers	11.18	0.59	3.38	18	0	18
a210	Number of class 8 streams in 2013	1.09	0.05	0.29	1	1	2
a211f	School has electricity	0.36	0.09	0.49	1	0	1
a213ca	Teachers have flush toilets	0.03	0.03	0.17	1	0	1
a216b	Parents maintain buildings	0.61	0.09	0.5	1	0	1
a216c	Parents maintain facilities	0.73	0.08	0.45	1	0	1
a216f	Parents purchase equipment	0.3	0.08	0.47	1	0	1

Note. Min=Minimum; Max=Maximum; n=33, SEM= Standard error (mean); SD= Standard deviation

Source: Stata Output, 2014

In Table 5 the outcome variable's mean is 263.2 with the score ranging between 220.06 and 318.14 with a gap of 98.08 marks. This suggested that there were great disparities in the mean performance among the schools sampled. The results further suggested that there existed great disparities in the variables that account for school performance among the schools. The results also showed that most of the head teachers had 9 years of head ship experience with 7 years in the current station. The results indicated that most of the head teachers had stayed longer in their current stations suggesting that they had great influence on the schools activities. Similarly, the schools sampled had experienced teachers who had served a minimum of six years in their current school. The results for both the head teachers and the teachers experience in their

school indicate that both had contact with the pupils whose KCPE mean score was studied for at least six years. This indicated that these teachers had handled these pupils from class 2. Therefore, the results suggested that the teachers sampled had great influence of the academic achievement of the pupils in the sampled schools.

The result's also showed that more than half of the teachers of the sampled schools were employed by the government and that each school had at least six of this teachers indicating that the schools sampled had qualified permanent teachers who were adequate. This was expected to impact positively on the school KCPE mean score.

3.4.4 The Effect of Teachers Academic Qualification on the School Academic Achievement

The second objective of this study was to establish the effect of the teacher's academic qualification on school academic achievement in public primary schools in Khwisero Sub-County. Data for meeting objective ii was generated by testing the null hypothesis that there is no significant effect of the teacher's academic qualification on the school academic achievement in public primary schools in Khwisero Sub-County using Multiple Linear Regression Analysis (MLRA). As mentioned earlier the test was appropriate in establishing the effect of the multiple explanatory variables on school KCPE mean score. Two models were fitted to measure the effect of teachers' academic qualification on school KCPE mean scores. The first model fitted the outcome variable and two dummy variables (a47a and a47c) for teachers' academic qualification. Dummy a47b (Form 6 KACE) was dropped because it had a high negative correlation, r=-0.9738, *p*=<0.0001, with a47a (Form 4 KCE/KCSE) which would have introduced collinearity issues in the model. The second model (2) adjusted for school characteristic variables (a26ab, a26bb, a26ca, a210, a211f, a211f, a216b, a216c and a216f).

The same interpretation as used in the MLR model in Table 4.8 was used. The significance of the relationship between a given independent variable and the dependent variable was tested at p=0.05. The results are presented in Table 6.

Table 6: The Effect of the Teacher's Academic Qualification on the School Academic Achievement as Measured by Multiple Linear Regression Coefficients

Variable	Variable label	Model 1, a21	Model 2, a21
a47a	Form 4 KCE/KCSE	-15.39 (10.59)	-12.66 (10.19)
a47c	Bachelor's degree	-75.09 (46.13)	-18.33 (46.52)
a26ab	Number of TSC male teachers		0.853 (3.390)
a26bb	Number of SMB male teachers		3.364 (2.625)
a26ca	Number of TSC teachers		-0.800 (1.949)
a210	Number of class 8 streams in 2013		-25.61** (7.792)
a211f	School has electricity		11.91† (6.664)
a216b	Parents maintain buildings		5.106 (8.859)
a216c	Parents maintain facilities		8.224 (7.078)
a216f	Parents purchase equipment		12.09† (6.893)
Constant		277.6*** (8.484)	284.5*** (14.36)
n		33	33
Prob> F		<0.0001	<0.0001
R^2		0.104	0.613
Adjusted R^2		0.044	0.437
Root Mean Squared Error (RMSE)		21.62	16.61

Note. Robust standard errors in parentheses; RMSE=Standard deviation of the regression model (the closer to zero better the fit), †p<.10 *p<.05, **p<.01, ***p<.001

Source: Stata Output, 2013

The results in Table 7 showed that the constant of regression was significant for both model 1 and 2, an indication that the model captured all the pertinent variables that explained the school KCPE mean score. Similarly, the R^2 for the two models were significantly different from zero at p=0.05 indicating that all the coefficients in the model were significantly different from zero and were important in explaining the school KCPE mean score of public primary schools in Khwisero Sub-County.

The results in model 1 showed a negative effect of a47a and a47b on school mean scores, although the coefficients are not significant. Model 1 was significant (Prob>F = 0.1458) and explained 4.4% (adjusted R^2) of the variance in the outcome variable. When school-specific variables (a26ab, a26bb, a26ca, a210, a211f, a216b, a216c and a216f) were accounted for, model 2 was also significant (Prob> F = <0.0001) and its adjusted R^2 improved to account for 43.7% of the variation in the outcome variable, up from 4.4% in model 1. This suggested that the control variables explained a large variation in the outcome variable.
In the full model, the number of class 8 streams in 2013 (a210), if the school had electricity (a211f) and if parents purchased equipment for the school (a216f) had coefficients that were statistically significant, -25.61(*p*=0.003), 11.91(*p*=0.088) and 12.09(*p*=0.093) respectively. In perspective, the results suggested that an increase by one more stream in class 8 would be associated with a decrease of up to 25.61 points in school KCPE mean score. The results were in agreement with those in Table 7 showing that a one stream increase in class 8 would be associated with a decrease of up to 28.53 points in the school's KCPE means score with a 2.92 points marginal difference. This indicates that even with larger classes' teachers' academic qualifications were able to reduce the negative effect of large class size on school's KCPE means score by 2.92 points in comparison to teachers' length of service with similar school characteristics. This suggested that a teacher's qualification was a better predictor of the school's KCPE means score in the Sub-County in comparison to a teacher's length of service. This perhaps suggests that schools in the Sub-County should encourage teachers to seek professional advancement as well as promoting teachers to motivate them so as to improve on the school's KCPE means score.

Connection to electricity predicted an increase of 11.91 mean score points and if parents contributed in purchasing equipment for the school, then such a school's mean score would increase by 12.09 points. This probably points to the importance of parents and community participation in school infrastructural development. These last two results are significant at 10%. With the predictors (a47a and a47c) failing to obtain a statistically significant effect on the outcome variable in the full model, this study failed to reject the null hypothesis.

These results are similar to those of Kiesling (1984); Ehrenberg & Brewer (1994) which disputed that teacher's academic qualification had an effect on pupils' academic achievement. The results support Murnane (1996) assertion that the requirement for teachers to have a second degree raises the cost, financially as well as the time, of teacher education, which may impact negatively on teachers' performance. This perhaps may add value to the TSC current policy which requires teachers to apply for study leave when seeking to advance with their education and teachers being posted at the same level despite the advancement. The study results clearly show that the commission is in the right track.

Similarly, the results support the findings of Hanushek (2000), survey of 113 studies on the impact of teachers' qualifications on their students' academic achievement. The results showed that Eighty-five percent of the studies found no positive correlation between the educational performance of the students and the teacher's educational background. These results also suggest that higher teacher qualification did not make better students.

Therefore, this study results does not support those put forth by other studies (Betts, Zau, & Rice, 2003; Ferguson & Ladd, 1996; Goldhaber& Brewer, 1997, 2000; Rowan, Chiang, & Miller, 1997) that teachers' academic qualification had an effect on academic achievement of pupils.

The full model adjusted for school characteristics and teacher's academic qualification was thus specified as:

$$KCPE\ mean\ score_{schooli} = \beta_0 + \beta_{1i}a47a_{1i} + \beta_{2i}a47c_{2i} + \beta_{3i}a26ab_{3i} + \beta_{4i}a26bb_{4i} + \beta_{5i}a26ca_{5i} + \beta_{6i}a210_{6i} + \beta_{7i}a211f_{7i} + \beta_{8i}a216b_{8i} + \beta_{9i}a216c_{9i} + \beta_{10i}a216f_{10i} + \varepsilon_i$$

The findings of the MLR revealed that the model was able to account for 43.7% of the variation in the school KCPE means scores in the Sub-County. The null hypothesis under objective ii tested the effect of teachers' academic qualification on the school's academic achievement. With the predictors; teacher has Form 4 KCE/KCSE and the teacher has a Bachelor's degree failing to obtain a statistically significant effect on the outcome variable in the full model, this study failed to reject the null hypothesis. The findings suggested that the school academic achievement in the Khwisero Sub-County was not explained by the teachers' academic qualification rather by the number of class 8 streams in 2013 (a210).

Similarly, the findings showed that a one stream increase in class 8 would be associated with a decrease of up to 25.61 points in the school KCPE means scores. The findings also suggested that schools with many candidate streams would register lower performance in KCPE compared with those having one steam for the candidate class in the Sub-County.

The findings also showed that even with larger classes' teachers' academic qualifications were able to reduce the negative effect of large class size on school's KCPE means score by 2.92 points in comparison to teachers' length of service with similar school characteristics. This suggested that a teacher's qualification was a better predictor of the school's KCPE means score in the Sub-County in comparison to a teacher's length of service. This perhaps suggested that schools in the Sub-County should encourage teachers to seek professional advancement as well as promoting teachers to motivate them so as to improve on the school's KCPE means score.

3.5 Conclusions

The findings of the study revealed that a S1/Diploma teacher predicted higher scores for the schools KCPE means than a P1teacher while Approved Teacher Status predicted lower points than P1 and S1/Diploma teachers respectively. It was concluded that only qualification to the level of S1/Diploma could predict higher schools KCPE means score and that the rush for degrees by primary school teachers with the hope of better pay because of acquired higher knowledge, skills and pedagogy had a negative impact on the schools KCPE mean score in the Sub-County indicating the need for Teachers Service Commission to check on this practice.

3.6 Recommendations

The following recommendations were made from the conclusions drawn from the themes under the main objectives of the study

The findings of this study showed that only teacher qualification to the level of S1/Diploma predicted higher schools KCPE means score. It was therefore recommended that Teachers Service Commission should check on the rush for degrees by primary school teachers with the hope of better pay as this acquired higher knowledge, skills and pedagogy had a negative impact on the schools KCPE mean score in the Sub-County. This could be achieved by either transferring teachers who have acquired higher degrees to secondary schools or Teachers Training colleges.

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