International Journal of Management and Leadership Studies
2020; 4(iv): 131-139
https://doi.org/10.52281/jv3i113
ISSN 2311 7575

TEACHER EFFECTS ON HIGH SCHOOL ACADEMIC ACHIEVEMENT SCORES: A CASE STUDY OF BUSIA COUNTY, KENYA

Julius K. Maiyo[1] and Manasi Echaune[2]
**Email: maiyojulius@yahoo.com, maiyojulius@kibu.ac.ke*
[1,2]Department of Educational Foundations and Educational Planning and Management
Kibabii University, Kenya

ABSTRACT

This study sought to analyze teacher effects on high school academic achievement scores in Busia County, Kenya. The study was based on the education production function theory. A descriptive survey research design was employed. A sample of 236 teachers and 755 students was used. Self administered questionnaires were used to collect data and test re-test was used to ascertain reliability of the instrument. Descriptive statistics namely; percentages, frequencies, mean, and standard deviations were used to carry out preliminary data analysis. Inferential statistics specifically correlation and regression coefficients were then used to test hypotheses. Hierarchical linear modeling was used to model effect of selected teacher variables on school academic achievement scores. Findings of the study were presented in tables and figures. Findings of the study suggested that the number of teachers, teacher commitment and teachers covering missed lessons had statistically significant effects on school academic achievement scores.

Key words: Teacher Variables, Academic Achievement Scores, Kenya

INTRODUCTION

Do teachers and classroom practices affect learners' academic achievement scores? Of course there is no doubt. Teachers have been known to play a critical role in the teaching and learning processes. For instance, teachers simplify complex concepts that students cannot understand on their own (Ozan and Bengu, 2016). In addition, teachers' role is crucial in translating education policy into action (Wright, Horn and Sanders, 1997). However, even where research findings have strongly confirmed a positive relationship between teacher input and academic achievement scores, instances of school ineffectiveness are still being reported. For decades now, some scholars and researchers on school effectiveness and education quality contend that optimally utilization of the teacher input would only be achieved if and when we will be able to establish the extent to which individual teacher variables relate to improved teaching processes. For instance, it is important to know whether teacher qualifications have the same effect on school academic achievement scores as teacher gender, age, experience and so forth.

The Coleman Report of 1966 is probably one of the landmark attempts to address the issue of school academic achievement as measured by standardized test scores and school resource characteristics in relation to education quality (Swando, 2016). Thereafter, other studies engaged into investigating whether increasing the number of teachers and reducing class sizes translated to better learning outcomes (Hanushek, 1979; 2002; Todd and Wolpin, 2003; Pscharopoulos and Woodhall, 1988). Numerous empirical studies have also confirmed that reducing teacher weekly teaching load matters (Sichambo, 2011; Calvo et al 2000; Mayeku, 2009; Waseka, Simatwa and Okwach, 2016). Byamugisha (2014) and Konstantopoulos (2005) also demonstrated that effective and adequate teachers produce better performing students. Needless to say, studies on teacher effects have continued to inform decisions by governments and development partners such as the World Bank on expenditure on teacher training and recruitment.

As noted earlier, despite the numerous efforts to identify teacher variables that are positively correlated with teacher effectiveness, what really makes an effective teacher still largely remains a mirage. For instance, Fehintola (2014) observed eight teacher variables that had a relatively large impact on educational outcomes. These variables included; teachers academic qualification, teachers professional qualification, teachers content knowledge, teachers instructional quality, teachers' evaluation procedures, teachers' work value, teachers' classroom attendance' and teachers' job satisfaction. Of the eight teacher variables modeled in the study, only teachers' knowledge of subject content made the most significant relative contribution to students' academic achievement while teachers' professional qualification and classroom attendance had low predictive value.

Glewwe and Hanushek (1971, 1981, and 1986) on one hand had demonstrated that teacher characteristics such as teacher experience and education had statistically significant effect on students' academic achievement scores. Interestingly, other studies by the same author suggested that teacher characteristics were non-significant (Hanushek, 2005, 2006, 2010). Other investigations established effective classroom environments such as teachers' organizational skills and relationship with students (e.g., McCaffrey, Miller, & Staiger, 2013).

Kimani, Kara and Njagi (2013); Wanjiku, (2013) and Musili, 2015) alluded that the significant variation in mean scores observed across Kenyan schools were largely associated with teacher related variables. In a separate study, Wanjiku (2013) sought to establish teacher effects on students' academic achievement in Kenya. The study reported that pupils' academic achievement was largely influenced by teacher related variables and instructional practices. In particular, the head teachers' professional qualifications had the strongest positive correlation with students' academic performance. Musili (2015) had also examined the relationship between teacher factors and students' academic achievement scores and observed that had a positive effect on students' academic performance. From these studies and many others, there seem to exist glaring contradictions as to what are the teacher variables keys to academic achievement scores. The question that then needs to be addressed, at least for now, is which of the teacher variables is of more value than others? The current study therefore seeks contribute to the growing debate on the subject by analyzing the teacher effects on academic achievement scores in Busia County, Kenya.

STATEMENT OF THE PROBLEM

Teacher salaries, training and development continues to take quite a large proportion of education expenditure for many countries. This is based on the assumption that employing more teachers translates to improved learning outcomes. The believe that employing and improving teacher effectiveness through training would lead to better learning outcomes largely influenced World Bank and International Monetary Fund (IMF) lending policies to education projects in the 1960 and early 1970s. However, despite the numerous efforts to improve teacher effectiveness, the question that

remained unanswered, of course, has been why do variations in academic achievement scores persist across schools? Whereas evidence on relationship between educational inputs like provision of text books and student achievement is quite clear, evidence on relationship between teacher variables and academic achievement scores is often scanty, ambiguous and in some cases conflicting (Rivkin, Hanusheck and Kain, 2005; Psacharopolous and Woodhall; 1987; Heynemann, Farrell and Sepulveda –Stuardo, 1978). This study seeks contribute to the discourse on teacher effects on academic achievement by answering two research questions namely; (i) To what extent do teachers affect school academic achievement scores and (ii) What makes the difference between teachers in relationship to school academic achievement scores?

THEORETICAL FRAMEWORK

This study was based on the production function theory (Von Thunen, 1826;. Initially Von Thunen developed the basics of the theory of marginal productivity which explained that a piece of land is put into use is a function of the cost of transport to the market and land rent the farmer can afford to pay. It is also generally believed that Von Thunen was the first to formulate the relationship between output and the inputs. The concept of production function theory later evolved to education production function (Cobb and Douglas, 1927) expressed as;

$$T = a_0 + a_1F + a_2R + a_3I + \ldots\ldots\ldots\ldots + e$$

Where; T is the outcome of the educational production process as measured, e.g., by academic achievement scores. The vector F represents facets of student and family background characteristics, R is a vector that measures school resources, I are institutional features of schools and education systems, A is individual ability, a_1, a_2 and a_3 are coefficients of relationships whereas e is the unexplained variance in educational outcomes. In the current study, F, R and I represent student characteristics, teacher variables and non teacher school variables respectively

RESEARCH METHODOLOGY

This study was carried out in Busia County, Kenya. A correlation design was employed. A sample of 236 teachers and 755 students was used. Self administered questionnaires were used to collect data. Test re-test was used to ascertain reliability of the instrument. Descriptive statistics namely; percentages, frequencies, mean, and standard deviations were used to conduct preliminary analysis of data while inferential statistics specifically; correlation and regression were used to test hypotheses. Hierarchical linear modeling was used to model the relationships between the independent and the outcome dependent variables. Findings of the study were presented in tables and figures.

RESULTS AND DISCUSSIONS

DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The respondents comprised of 755 students and teachers 236 sampled from 100 secondary schools. Of the 755 students sampled, 484 (64.1%) were male. Majority of the students had scored 251-300 marks in the Kenya Certificate of Primary Education (KCPE) which is a secondary school entry examination. The teachers' sampled consisted of 138 (58.5%) and 98 (41.6%) female teachers respectively.

DESCRIPTIVE STATISTICS OF VARIABLES USED IN ANALYSIS

The results displayed in Table 1 indicates the descriptive statistics for the dependent variable, and the independent variables namely; student characteristics, teacher variables and school non teacher variables.

Table 4.7: Descriptive Statistics for the Variables Used in Analysis

Var.	Variable Label	Mean	SE(Mean)	SD	Min	Max
a1z	Outcome variable (Academic Achievement)	0.00	0.03	1	2.04	2.59
a1c	Student's prior academic achievement	274.89	1.29	37.81	150	410
a2a	Student's parent involved in discussing academic	2.77	0.04	1.06	0	4
a2b	Student's parent's provision of school requirements	2.77	0.04	1.03	0	4
a2c	Student's parent involved in attendance of meetings	2.69	0.04	1.05	0	4
s2f	Number of streams	2.28	0.04	1.27	1	6
s2g	School enrolment	374.69	5.78	168.90	144	845
s2h	School mean score 2015	4.80	0.05	1.58	2	8.931
s2i	School mean score 2016	3.42	0.03	0.92	2	5.992
s2j	Average school mean score 2015/16	4.08	0.04	1.08	2.31	7.308
s3p	Students participation in co-curricular	2.17	0.04	1.08	0	4
tv_1	Number of TSC teachers	10.37	0.19	5.69	0	28
tv_2	Number of BOM teachers	6.96	0.10	2.80	4	16
tv_3	Total number of teachers	17.34	0.27	7.78	8	40
tv_4	Teacher's miss lessons	3.43	0.03	0.93	2	4
tv_5	Teachers cover missed lessons	2.31	0.03	0.85	0	4
tv_6	Teachers assist weak students	2.31	0.03	0.88	0	4
tv_7	Teachers adhere to code of conduct	2.70	0.03	0.86	0	4
tv_8	Teacher teamwork	2.49	0.03	0.89	1	4
tv_9	Teacher relationships	2.44	0.03	0.80	0	4
tv_{10}	Teacher-parent relationships	2.55	0.03	0.90	0	4
tv_{11}	Teacher-student relationship	2.58	0.03	0.91	0	4
tv_{12}	Teachers duty reporting time	2.33	0.03	0.84	0	4
tv_{13}	Teachers commitment to duty	2.31	0.03	0.87	0	4
s3l	Availability of text books	2.83	0.04	1.16	0	4
s3n	Availability of physical facilities	2.34	0.04	1.06	0	4
	Nominal and Dummy Variables [Frequencies preceding percent in ()]					
s0e	Rural school: 0=Student is in urban school, 312 (36.49); 1=Student is in rural school, 543 (63.51)					
a1a	Female student: 0=Male, 413(60.00); 1=Female, 342 (40.00)					
s2a3	Boys secondary schools: 0=Other classification, 672 (90.29); 1=Boys secondary schools 83 (9.71)					
s2b	School is boarding: 0=School is not boarding 438 (51.23); 1=School is boarding 417 (48.77)					

Note. SE=Standard Error; SD=Standard Deviation; Min=Minimum; Max=Maximum; Var. =Variable

The dependent variable was expressed as a standardized student score (a1z). The standardized outcome variable had a mean of 0.00 (SE =0.03, SD=1) while the un-standardized outcome variable ranged from 2.310- 7.308. With SD = 1.000, it could be concluded that there was large variability in academic achievement scores across the sample schools. In addition, Table 1 depicts that the Standard Error (SE or STD Err) for the mean of standardized outcome variable was 0.03. Kothari (2010) defined a standard error (SE) of a mean as an estimate of the amount that an obtained mean is expected to differ by chance from the true mean. Std Err is therefore an indication of the reliability of the mean.

The small Standard Error (STD Err) of the mean of the outcome variable reported here was a clear indication that the sample means for academic achievement an accurate estimation of the population mean. The average school size was three hundred and seventy four (374) students with school enrolment ranging from one hundred and forty four (144) students to eight hundred and forty five (845) students. Table 1 also depicted that the average student prior achievement was 274.79 and the average number of teachers per schools was 17.34. The most understaffed was reported to have only four teachers. It could also be observed that the average student enrolment across the schools was three hundred and seventy four (374) students while the average number of teachers per school was seventeen (17).

The results shown in Table 1 suggest that on a scale of 0-4, where; 0 represented "teachers don't attend to lessons at all" and 4 represented "complete attendance to lessons" the mean of teacher lesson attendance was 3.43.

Similarly, on a scale of 0-4, where "0" meant that teachers never covered missed lessons and 4 meant that teachers fully covered lessons missed, the variable labeled "teachers covered missed lessons" was 2.31.

RELATIONSHIP BETWEEN SELECTED TEACHER VARIABLES AND ACADEMIC ACHIEVEMENT SCORES

The study sought to establish the extent which selected teacher variables affect academic achievement scores. Preliminary data analysis was in form of pair wise correlation between standardized academic achievement scores and selected teacher variables.

Table 2 presents the pair wise correlation results of the relationship between selected teacher variables and students' academic achievement scores.

Table 2 Pair-Wise Correlation Matrix for Teacher Variables and Student Academic Achievement

Var	Var. Label		a1z	s2c	s2d	s2e	s3a	s3b	s3c
a1z	Student's KCSE z-score	[a]	1						
tv_1	Number of TSC teachers	[a]	0.453	1					
		[b]	<.001						
tv_2	Number of BoM teachers	[a]	0.154	0.647	1				
		[b]	<.001	<.001					
tv_3	Total number of teachers	[a]	0.339	0.962	0.831	1			
		[b]	<.001	<.001	<.001				
tv_4	Teacher lesson attendance	[a]	0.035	0.357	0.245	0.348	1		
		[b]	<.001	<.001	<.001	<.001			
tv_5	Teacher covers missed lessons	[a]	0.366	0.271	0.242	0.285	0.377	1	
		[b]	<.001	<.001	<.001	<.001	<.001		
tv_6	Teacher assist weak students	[a]	0.330	0.269	0.248	0.285	0.291	0.312	1
		[b]	<.001	<.001	<.001	<.001	<.001	<.001	
tv_7	Adheres to TSC code of conduct	[a]	0.126	0.150	0.176	0.173	0.260	0.288	0.199
		[b]	<.001	<.001	<.001	<.001	<.001	<.001	<.001
tv_8	Teacher embraces teamwork	[a]	0.191	0.381	0.255	0.369	0.828	0.387	0.319
		[b]	<.001	<.001	<.001	<.001	<.001	<.001	<.001
tv_9	Teacher- Teacher relationship	[a]	0.181	0.309	0.267	0.321	0.351	0.720	0.274
		[b]	<.001	<.001	<.001	<.001	<.001	<.001	<.001
tv_{10}	Teacher-Parent relationship	[a]	0.170	0.180	0.108	0.170	0.208	0.176	0.258
		[b]	<.001	<.001	0.002	<.001	<.001	<.001	<.001
tv_{11}	Teacher-Student relationship	[a]	0.177	0.078	0.027	0.066	0.242	0.228	0.156
		[b]	<.001	0.024	0.434	0.054	<.001	<.001	<.001
tv_{12}	Teacher time consciousness	[a]	0.162	0.255	0.223	0.266	0.363	0.975	0.293
		[b]	<.001	<.001	<.001	<.001	<.001	<.001	<.001
tv_{13}	Teacher commitment to duty	[a]	0.341	0.254	0.225	0.265	0.270	0.283	0.963
		[b]	<.001	<.001	<.001	<.001	<.001	<.001	<.001

Note. Pair-wise correlation: ≤0.35 = Weak correlation; 0.36-0.67 = Moderate correlation; 0.68-0.89=Strong correlation; ≥0.90 = Very strong correlation; Adapted from "Interpretation of Correlation Coefficient, " by R. Taylor, 1990, Journal of Diagnostic Medical Sonography, 6(1), p. 37; Var.= Variable

[a] Pearson correlation coefficient; [b] *p*-values (α=.05)

From the results reported in Table 2, the number of TSC teachers (tv1) depicted the strongest positive effect on academic achievement scores (r=0.453, p<0.001). Finding of the study tend to agree with Kimani, *et al* (2013) who reported that schools where teachers had a smaller workload reported significantly higher academic achievement scores. These findings have implications for government on teacher staffing. For quite a while, there have been calls from different quarters asking the government of Kenya to employ more teachers so as to bridge the teacher shortage across the country. The Kenya National Union of Teachers (KNUT) had estimated teacher shortage in Kenya at close to 120,000 (KNUT, 2018). From findings of this study, it could be concluded that there was need to employ more teachers as this would translate to improved academic achievement scores.

It can be observed from the findings presented in Table 2 that the extent to which teachers covered missed lessons (tv_5) was also statistically significant but moderate relationship with students academic achievement (0.339, p<0.001). This finding could be easily be construed to mean that it paid dividends for teachers to cover lessons missed. In addition, there was a significant relationship between student academic achievement scores and teachers assisting weak students (tv_5) (0.366, p<0.001). This finding has important implications on the policy of having no remedial lessons.

Teacher input variable labeled "teachers time of reporting on duty" equally returned a weak statistically significant effect on students academic achievement scores (r=0.1620, p<0.001). However, this result should not be surprise. After all, it was possible for teachers to report on duty on time but not attend to lessons or not actively engage students in activities that translate to improved academic achievement. This finding has useful implications on school administrative practices. School administrators should not just be keen on the time teachers report on duty, but should probably effectively supervise curriculum implementation. This argument is collaborated by the fact that teacher commitment to duty (tv_{13}) was found to have a fairly moderate effect as compared to the weak effect of teacher duty reporting time (r=0.340, p<0.001).

RANDOM INTERCEPT MODEL FOR SELECTED TEACHER VARIABLES

Selected teacher variables that were statistically significant at p=000 were then used to fit a two level hierarchical linear model containing student variables, teacher variables and specific non teacher school variables. This model was used to measure effects of teacher variables on academic achievement scores. The model was constructed by adding the independent variables step by step. By so doing, it was possible to carry out variance partitioning to isolate teacher variables that accounted for the variation in academic achievement scores across schools. Table 3 presents the results for a two level random intercept model for selected teacher variables, school non teacher variables and student variables.

Table 3: A two Level Random Intercept Model for Selected Teacher Variables

Fixed Effect							
Var	Variable label	Model 1 (Student)		Model2 (Teacher Variables)		Model 3 (Non teacher School Variables)	
		Est. (SE)	*P*	Est. (SE)	*P*	Est. (SE)	*P*
a1a	Female student	0.12 (0.05)	0.030	0.11 (0.05)	0.034	0.10 (0.05)	0.057
a1c	Student's prior academic achievement	0.00 (0.00)	0.012 <.001	0.00 (0.00)	0.033	0.00 (0.00)	0.036
a2a	Student's parent involved in discussing academic	0.16 (0.03)	<.001	0.16 (0.03)	<.001	0.16 (0.03)	<.001
a2b	Student's parent's provision of school requirements	0.15 (0.03)	<.001	0.15 (0.03)	<.001	0.14 (0.03)	<.001
a2c	Student's parent involved in attendance of meetings	0.12 (0.03)	<.001	0.12 (0.03)	<.001	0.12 (0.03)	<.001
tv_1	Number of TSC teachers			0.09 (0.20)	0.412	0.08 (0.20)	0.050
tv_2	Number of BoM teachers			0.08 (0.20)	0.794	0.07 (0.20)	0.543
tv_3	Total number of teachers			-0.06 (0.20)	0.280	-0.08 (0.20)	0.701
tv_4	Teacher missed lessons			-0.08 (0.04)	0.004	-0.08 (0.04)	0.050

Fixed Effect							
Var	Variable label	Model 1 (Student)		Model2 (Teacher Variables)		Model 3 (Non teacher School Variables)	
		Est. (SE)	*P*	Est. (SE)	*P*	Est. (SE)	*P*
tv_5	Teacher covers missed lessons			-0.12 (0.12)	0.114	-0.14 (0.12)	0.257
tv_6	Teacher assisted weak students			-0.01 (0.09)	0.272	-0.02 (0.09)	0.861
tv_7	Teacher adhered to code of conduct			0.00 (0.03)	0.668	-0.01 (0.03)	0.815
tv_8	Teacher embraced teamwork			0.08 (0.05)	0.046	0.08 (0.05)	0.049
tv_9	Teacher-Teacher relationships			0.01 (0.04)	0.597	0.01 (0.04)	0.834
tv_{10}	Teacher-Parent relationships			0.01 (0.03)	0.450	0.00 (0.03)	0.886
tv_{11}	Teacher-Student relationship			0.01 (0.03)	0.103	-0.00 (0.03)	0.984
tv_{12}	Teacher's time of reporting on duty			0.12 (0.12)	0.514	0.12 (0.12)	0.302
tv_{13}	Teacher commitment to duty			0.04 (0.09)	0.249	0.04 (0.09)	0.050
s2f	Number of streams					0.18 (0.11)	0.102
s2h	School mean score 2015					0.07 (0.05)	0.128
s3l	Availability of text books					-0.00 (0.02)	0.869
s3n	Availability of physical facilities					0.04 (0.02)	0.048
	Intercept	-1.68 (0.21)	<.001	-2.15 (0.27)	<.001	-2.26 (0.29)	<.001
Random Effect		*Variance Component*		*Variance Component*		*Variance Component*	
Student (Level-1), e_{ij}		0.3577 (0.02)		0.3548 0.02)		0.3524 (0.02)	
School (Level-2), u_j		0.2688 (0.05)		0.2231 (0.04)		0.2097 (0.04)	
Variance Explained percent (continued)							
Student (Level-1), σ^2_e		0.0565		0.0595		0.0620	
School (Level-2), σ^2_u		0.2869		0.3348		0.3489	
Model Fit Statistics							
Deviance		1743		1721		1711	
Akaike Information Criterion (AIC)		1759		1763		1761	
Bayesian Information Criterion (BIC)		1797		1862		1880	
Likelihood Ratio test vs. OLS Regression		chibar2(01) = 213	<.001	chibar2 (01) = 178	<.001	chibar2 (01) = 173	
Likelihood Ratio test (Preceding Model vs. Next)		χ^2 (5) = 169	<.001	χ^2 (13) = 222	0.057	χ^2 (4) = 10	

Note. N= 755; Var. = Variable; Est. = Estimate; Std. Err. = Standard Error (in parentheses); AIC and BIC statistics = smaller-is-better fit; OLS=Ordinary Least Squares

A two hierarchical linear model was adopted so as to establish the extent to which selected teacher variables explain between school variations in academic achievement scores. The first model (Model 1) represents a student variable only model. In the second model (Model 2) selected teacher variables were introduced thereafter in model three, selected school non teacher variables were introduced (Model 3). The step by step procedure allowed the study to determine the teacher variables that were responsible for the variation in student academic achievement across schools.

Findings depicted in Table 3 suggest that student variables namely; student gender (a1a), student's prior academic achievement (a1c), level of student's parent involvement in discussing academic (a2a), student's parent's provision of school requirements (a2b) and student's parent involvement in attendance of school meetings (a2c) had statistically significant effects academic achievement score at the student-only-model. It can also be observed that six of the teacher variables were statistically significant. It is quite important to note that parental involvement was associated with improved academic achievement scores. From this finding, there is need to sensitize parents to take an active role in the education of their children.

Model 1 suggested that the proportion of explained variation and consequently the resulting percent variation explained at the two levels were 34.34 %, the rest being explained by teacher variables and school non teacher variables. When thirteen selected teacher variables of interest were finally introduced into the model, findings presented in Table 2 suggest that eight of the variables returned statistically significant results. Surprisingly, the eight variables combined could only account for 4.79 percent of the variation in academic achievement scores. In other words, the teacher variables estimated in the study predicted a relatively small effect on academic achievement scores.

The current findings had shown a significant departure from earlier studies. Fehintola (2014) and Waseka, Simatwa and Okwach (2016) demonstrated that teacher variables accounted for a massive 54.6% and 59.4% of variation of academic achievement scores respectively. However, the researchers are of the opinion that difference in findings of the current study and other related studies should not cause an alarm. The difference could easily be associated to the mere fact that the teacher variables of concern in the current and previous studies were quite different. In short, the current study tended to delve into teacher variables that no other study had investigated before.

Finally, Model 3 fitted non-teacher school variables alongside student and selected teacher variables. The results shown in model 3 depicted that five teacher variables modeled in the study returned statistically significant results. The results also show that five student level variables namely; student prior achievement (a1c), student parent involvement in discussing academic issues (a2a), student parent involved in provision of school requirements (a2b) and student parent involved in attendance of school meetings (a2c) were statistically significant. The school non teacher variables namely availability of physical facilities (s3n) had a statistically significant effect on students' academic achievement at 5percent. Surprisingly, availability of textbooks (s3l) was non-statistically significant. The findings of the study also indicate that the proportion of variance in students academic achievement explained at the school level when school non teacher input variables were introduced into the model improved by (0.0134, 1.34 %), from 0.2231 in model 2 to 0.2097.

Apparently, the results shown in Table 3 suggest that physical facilities alone accounted for about 1.34 percent of the 56.86 percent available for explanation at school level. Overall, the two models explained up to 41.09 percent of the variation in academic achievement scores. Hence, level 2 variables accounted for 0.3489 of 0.5686 (0.3489/0.5686)*100= 61.36 %) of the variance available for explanation at that level. This left nearly 0.2197 (38.64%) of the variance available at school level unexplained. The unexplained variance could probably be attributed to variables that were not within the scope of the study. For instance, this study had not considered variables like teachers' age, qualifications and experience.

Based on the criteria set by Hungi and Thuku (2010), the results of this study could be interpreted to mean that the time teachers reported to school (tv_{12}) and teachers covering missed lessons (tv_{13}) could easily be flagged out as predictors of students' academic achievement scores. The findings implied that students who attended schools where teacher reported to school on time could achieve 0.12 standard deviation unit scores above their counterparts who attended schools where teachers reported late. In addition, the findings suggested that when teachers covered missed lessons, students achieved 0.14 standard deviation unit scores above their counterparts in schools where teachers hardly covered missed lessons.

After controlling for student and non-teacher school variables, the hypothesis test for significance for teacher variables returned non significant results for each. A joint test for all of the variables equally returned non significant results: chi2 (8) = 5.86, Prob > chi2 = 0.09511. With these tests, the researcher failed to reject the null hypothesis stating that teacher variables have non- statistically significant effect on student academic achievement scores.

From the education production function stated earlier (see equation 1) stated thus; $T = a_0 + a_1F + a_2R + a_3I + e$, we could estimate the teacher effects on academic achievement scores. The model suggests that teacher variables investigated under the study explained for close to 4.79% of the variation in academic achievement score. Of more concern, is the large unexplained variation (e) at school level that stood at 38.64%.

CONCLUSION

From findings of the study, it was concluded that the time teachers reported to school and teachers covering missed lessons were significant predictors of students' academic achievement scores. In addition, the number of trained teachers had a statically significant relationship with student academic achievement scores.

RECOMMENDATIONS

Based on the conclusions of the study, it is recommended that;

i. Teachers should be encouraged to cover missed lessons
ii. The government should ensure that all schools are adequately staffed so that teachers have manageable loads that would enable them provide quality education to learners.
iii. Only teachers who are qualified and trained should be employed to teach in secondary schools.

REFERENCES

Calvo, R.A.,Markauskaite, L. &Trigwell, K. (2000). Factors Affecting Students' Experiences

Coleman, J. S. (1966). Equal schools or equal students?. *The Public Interest*, (4), 70.

Glewwe, P. W., Hanushek, E. A., Humpage, S. D., & Ravina, R. (2011). School resources and educational outcomes in developing countries: A review of the literature from 1990 to 2010 (No. w17554).National *Bureau of Economic Research*.

Hungi, N., and Thuku, F.W. (2010*)*. "Differences in pupil achievement in Kenya: implications for policy and practice." *International Journal of Educational Development*, 30: 33-44. http://dx.doi.org/10.1016/j.ijedudev.2009.05.001.

Hanushek, E. A. (1979). Conceptual and empirical issues in the estimation of educational Production functions. *Journal of Human Resources, 14(3), 351–388.*

Konstantopoulos, S. (2005). Trends of school effects on student achievement: Evidence from NLS: 72, HSB: 82, Kimani, G.N., Kara, M.A., and Njagi, L.W. (2013). Teacher factors influencing students' academic achievement in secondary schools in Nyandarua County, Kenya. *International Journal of Education and Research* Vol. 1, 117-119

Mayeku, B. (2009). Policy Guidelines and Challenges in Quality Assurance in Distance Learning Programmes in Kenyan Public Universities. An unpublished M.ED Thesis: Maseno University.

Mihaly, K., McCaffrey, D. F., Staiger, D. O., & Lockwood, J. R. (2013). *A composite estimator of effective teaching*. Seattle, WA: Measures of Effective Teaching. Project, Bill and Melinda Gates Foundation.

Psacharopolous, G., and Woodhall, M. (1985). Education for Development: An analysis of Investment Choices. New York: Oxford University Press.

Sichambo, N.M. (2011). Impact of Burnout on Secondary School Teachers' Performance: A case of Bungoma North District. An unpublished M.ED Thesis: MMUST.

Rivkin, S. G., Hanushek, E. A, & Kain, J. F. (2005). *Teachers, schools, and academic achievement.*[Online] Available: http://www.utdallas.edu/research/tsp/pulications.htm.

Swado, S. (2016). Does Teacher Quality Affect Student Achievement? An Empirical Study in Indonesia Journal of Education and Practice ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)Vol.7, No.27, 2016www.iiste.org

Todd, P. E., & Wolpin, K.I. (2003). On the specification and estimation of the production function for cognitive achievement. *Economic Journal, 113(485), F3–F33.*

Waseka, L.E, Enose, M.W. Simatwa, E.M.W, and Okwach, T.O. (2016). Influence of Teacher Factors on Students' Academic Performance in Secondary School Education. A Case Study of Kakamega County, Kenya. *Greener Journal of Educational Research.DOI:* http://doi.org/10.15580/GJER.2016.4.060216102

Wright, S. P., Horn, S. P. & Sanders, W. C. (1997). Teacher and Classroom Context Effects on Student Achievement: Implications for Teacher Evaluation. *Journal of Personnel Evaluation in education,* 11, 57-67.