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The influence of Unit Cost on Academic Performance of Learners in Day and Boarding Secondary Schools in Nandi County, Kenya

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Abstract: Given the rising cost of secondary education, leading to allocation of large amount of resources to secondary education, students' academic performance is expected to be better. This study analyzed the influence of Unit Cost on learners' academic performance in Day and Boarding secondary school in Nandi County, Kenya. The study was guided by Cost Function derived from the Education Production Function theory; it employed a survey as a research strategy. The study targeted all the principals in 186 public secondary schools in the Nandi County. It employed stratified random sampling and then systematic random sampling. Questionnaire and document analysis were for data collection. A pilot study was used to determine the reliability of the instruments. For validity of the research tool, experienced team of supervisors carefully and critically examined the instruments. Data was analyzed using means, percentages and linear regression analysis. It was found out that, average unit cost Ksh. 22,263 and Ksh. 54,828 for Day and Boarding secondary schools respectively. Furthermore, the findings revealed that, academic performance for the period (2012-2015), recorded an average mean of 7.1184 and 4.7391 for Boarding and Day secondary schools respectively. From the study, there was a positive significant ($p=0.000$) relationship between academic performance and unit cost in Boarding schools $t(28) = 4.192$, $p<0.05$. Similarly, there was a positive significant ($p=0.014$) relationship between academic performance and unit cost in Day schools, $t(91) = 2.503$, $p<0.05$. The recommendations are; there is need to priorities expenditure for acquisition of teaching and learning resources and thus enhance learner achievements. The Ministry of Education to explore cost effective measures to reduce unit cost of secondary education so as to improve access and performance. The findings generate ideas for better and more resourceful cost management in secondary schools, which is useful for policy makers and managers in education sector.

Keywords: Unit Cost, performance, Day school, Boarding school, Type of Schools, Learners.

INTRODUCTION TO THE STUDY

In Kenya, cost of education has continued to rise [1]. The burden of this rapidly rising cost of education has been shouldered majorly by parents through the policy of cost sharing [2]. Over the years, Kenyan government has also been allocating huge resources to education sector in general and more so to the secondary education sub-sector. Table-1 below shows total expenditure for the Ministry of Education and total expenditure for secondary education sub sector for the period 2010/2011 to 2015/2016 financial years. The table also shows number of KCSE candidates, mean score and mean grade for the same period.

Table-1: Total Expenditure and KCSE Performance for the MoEST for the period 2010/11 to 2015/16. Ksh. in millions

Description	2010/11	2011/12		2012/13	2013/14	2014/15	2015/16
Total Expenditure for the MoEST	179,000	207,460		260,122	251,212	284,165	319,425
Total Expenditure for Secondary Education	3,026	19,198		25,076	22,803	29,862	32,996
Canditature		354,341	410,586	432,443	445,520	482,133	512,630
Means Score		5.14	5.24	5.17	5.12	5.39	5.44
Mean Grade		C-	C-	C-	C-	C-	C-

Source: Economic Survey 2016(Kenya)

From Table-1 above, total national government expenditure for the Ministry of education increased from 179 billion in the year 2010/2011 to 207 billion in 2011/2012, before getting higher to 260 billion in 2012/2013 and to 251 billion in 2013/2014 to 319.4 billion in the year 2015/2016. This was 78.2% increase in total expenditure for education sector. In the same period, total national government expenditure for secondary education rose from 3 billion in 2010/2011 to 32.9 billion in the year 2015/2016 this was a sharp increase of 996% or approximately ten times higher than it was in the financial year 2010/2011. From Table-1 above, the number of KCSE candidates nationally grew by 44.7 per cent from 354,341 in 2010 to 512,630 in 2015. It can be noted that over this period, while total expenditure for the ministry of education and that of the secondary subsector in particular increased tenfold, at the National level, KCSE performance remained at a mean score of just five (5) points out of the possible twelve (12) points. The average grade has been C minus yearly for the entire period.

At the County level, Table-2 below shows the Nandi County trends, in KCSE candidates enrolled and mean grade attained between 2010 and 2015.

Table-2: Nandi County Trends in KCSE Mean Grade - (2010-2015)

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Canditature	6,784	8,228	8,964	9,380	10,276	11,204
Means Score	5.32	5.41	5.59	5.38	5.71	5.98
Average Grade	C-	C-	C	C	C	C

Nandi County Education Office (2016)

From table-2 above, in Nandi County the number of KCSE candidates increased by 65.16 per cent from 6,784 in 2010 to 11,204 in 2015. However, over the same period, KCSE mean score paltry improved from 5.32 to 5.98. The mean score remained at between C minus and C plain out of a possible A.

Even with huge government allocation for secondary education, secondary schools are finding it difficult to meet expenditure of some vote heads such as personal emoluments [3]. Public secondary schools have been raising more funds through the PTA vote head to top up those vote heads whose allocation proved insufficient [4]. If the amounts allocated for a vote head prove inadequate, then it implies that the amount of expenditure anticipated is less than the actual cost of maintaining a student in school in a year (unit cost) which in turn affects the provision of the required teaching and learning resources for better academic achievements.

About more than three decades ago, Keeves [5] in the approaches to the goal of educational equality in renewal of Australian schools, found out that the type of school did not make any difference on students' academic performance. However, in a study by Ajayi [6] on the influence of school type and location on resource availability and pupils learning outcome in primary schools in Ekiti state, Nigeria, it was found out that school type make a difference in student academic performance. This agrees with a study by Yara and Catherine [7] who noted that the school category has effect on the academic performance of students in Mathematics.

Ngetich *et al.*, [1] in a study to determine unit costs of secondary schools in Nandi North District in 2009, it was found out that, a total of Ksh. 363,383,481 was the expenditure for the entire district, this was equivalent to Ksh.41,768 per student (unit cost). The findings point out that the average unit cost per District school was Ksh 34,849, while the average unit cost for the Provincial schools was Ksh. 50,966. Unit cost for Private schools stood at Ksh.35,778 while unit cost for public schools was Ksh.43,219. From the study, the main recommendation was that secondary schools should prioritize expenditure areas to pay more attention to areas such as acquisition of teaching and learning resources. However this study did not attempt to established the relationship between unit cost and academic performance in the different types of schools. The current study attempts to link unit cost and academic performance.

Examination results in both the KCPE and KCSE differ from school to school, from region to region and also by gender MoEST [8]. Academic performance at the secondary school level is given emphasis in Kenya; this may be because it is used for certification, selection to tertiary institutions, and search for employment and above all, used as a yardstick to evaluate educational achievements of the secondary schools level. KCSE examinations are administered nationally to test a wide range of subjects as stipulated in the secondary school curriculum. To achieve better academic performance, sufficient human and physical resources in addition to effective secondary school management are required [8]. To obtain sufficient teaching and learning resources, finances such as government grants, school fees collected from parents, donations and contributions from the community and Nongovernmental Organizations (NGOs) are required by secondary schools. For better performance in secondary education to be achieved, the indispensable physical and human resources must be obtained at a cost. This cost can be attributed to each individual

student in the secondary school system (unit cost). The higher the overall cost of teaching and learning resources the higher the unit cost. While sufficient resources are required, the cost implication becomes and inhibiting factor. In a scenario obtaining in Kenya; where there is increasing poverty levels in the majority of households, a large number of parents with children in the secondary school level are not in a position to adequately pay for these required teaching and learning resources. The implication to this may be poor performance in the national examinations.

A World Bank Report [9] pointed out that one reason for the low quality of education in Africa is that expenditure per student (unit cost) is very low by world standards. Although Hanushek [10] found out that there is no significant relationship between school expenditure and students' academic achievement, analysis of education cost provides valuable direction to education managers and other stakeholders on the tangible cost required in producing a graduate at any level of education. Such an analysis of education cost gives an insightful understanding into the model of educational expenditures [11]. Educational cost analysis is time and again useful in identifying the possible cost reduction strategies that can be employed from time to time. The need for cost reducing actions and policies are necessary towards cost effectiveness in secondary schools. The current study seeks to determine unit cost and examine the influence of unit cost on academic performance of learners in Day and Boarding secondary schools in Nandi County, Kenya.

The issue facing the educators and government alike is how to provide quality, relevant and accessible secondary education given the scarcity of resources. Watkins, Watt and Buston [12], observed that, in both developed and developing countries, there is increasing demand for effective secondary school system for the underprivileged youth. The challenge to most governments particularly those in developing countries, is how to provide quality and effective secondary education at lower unit cost. Inadequate financial resources are often seen as the origin of poor quality education, limited access and retention [13]. Education stakeholders more often than not enthusiastically consider adding more financial resources to secondary schools will develop the quality of secondary education and by extension improved school performance. However, studies in Education Production Function in both developed and developing countries have yielded inconsistent and mixed findings on the question of more resources for improved performance.

A study by Sika *et al*., [12] on the impact of unit cost on academic performance of public secondary education in Siaya, Kenya, found out that although the payment by parents to funding secondary education has steadily been increasing between 1997 to 2007 and overshadow the disbursement of the government, academic performance has been fluctuating over the same time. This study concluded that an increase in unit cost does not necessary mean an increase in performance index and therefore allocating more resources in the schooling process as a way of improving achievement need to be done with a lot of caution. They observe that school administrator should pay more attention to the purchasing power than the absolute or constant performance index which was previously demanded by society. Sika *et al*., [12] recommended that, the government need to reinforce the audit wing of the Ministry of Education so that it can examine the effectiveness of utilization of monetary resources collected and allocated to secondary schools and that there should be some efforts made towards sharing resources among District secondary schools and Provincial secondary schools through prearranged concurrence. It is therefore observed that emphasis is given to prudent management of resources rather than the question of how much resources can be channeled to the secondary school system.

However different findings were observed in a study by Munda and Odebero [14] which was aimed at determining how costs relate to the academic performance of District and County schools. In their study, it was established that there were disparities in costs of education both within and between the two categories of County and District schools. The average per student direct unit cost for county schools was almost twofold that of District schools. They attributed this to discrepancy in funding of these schools and that school fees were levied in a random way where there was no guideline. Given that better funding in many ways affect the quantity and quality of educational resources which schools acquire, these disparities between County and District schools could explain the better students' performance in county schools [14]. It is worth to note that, availability of finances have a bearing on the amount or the sufficiency of teaching and learning resources. However as Sika *et al.*, [12] posit that, giving out more resources in the schooling system as an approach of enhancing performance should be considered with a lot of prudence.

Hanushek [15] in his study on the impact of differential expenditures on school academic performance, analyzed results of 187 Education Production Function studies published during the previous 20 years and found out that no systematic positive relationship between student achievement and inputs namely; per-pupil expenditures (unit cost), student-teacher ratios, teacher education experience, teacher salary, school facilities and administrative factors. However Hanushek's findings have been challenged by other studies which use more refined research techniques. Hedges *et al.*, [16] in their meta-analysis of the effects of differential school inputs on student outcomes, reanalyzed Hanushek's work and they discovered that an increase in average spending per

pupil (unit cost) would significantly increase student achievement. Similarly, Crampton [17] made a presentation to the annual conference of the American education finance association on an analysis of the relationship of educational inputs on school outcomes, notes that expenditures seemed to matter when they bought smaller classes and more experienced, highly educated teachers.

In Nigeria a study by Ayodele [9] on the relationship between private cost and students' academic performance in secondary schools in Ekiti state, revealed that parents wielded great power in preparing and enabling students to continue in schools. The study further discovered that poor performance of students in their public examination was true and that the level of students' performance may not have been a good mirror image of the private cost. In this study, it was found out that, there was no significant relationship between private unit cost per student of secondary education and students' academic performance in secondary schools in the state. Out of these findings the study recommended that it was necessary to increase budgetary allocation for secondary education in the state, provide adequate instructional resources in all secondary schools and that education resource centers should be created in all the local government area headquarters by the state governments. However, this study did not attempt to determine the influence of unit cost on academic performance of learners in the types of secondary schools.

A study by Munda and Odebero [14] on the influence of education costs on students' academic performance in Kenya, found out that, fees charged in Bungoma County were decided by school Boards of Management (BOM) in discussion with the Parents and Teachers Associations (PTA) and with authorization from the County Education Board (CEB). The study found out that in addition to the government subsidy which came in assured tranches, the majority of the schools in the County collected less than 70% of their other budgeted income which almost wholly came from fees. The study further noted that, income trend indicated general rise in levies to go with the increasing cost of living. To be able to collect revenue, school headteachers have to regularly send students home to collect fees. Such a move destabilizes their performance or may ultimately make them drop out of school.

Ekanem and Ekpiken [18] in their study explored unit cost of education as a determinant of students' learning achievement in universities in Cross River State of Nigeria. The study found out that unit cost of both academic and non-academic staff could not establish the enormity of students' academic attainment in the universities studied. Ekanem and Ekpiken [18] observed that unit variable costs of education vary with changes in the number of student enrolments and it is a good quality measure of effective cost of education. The study concluded that even though qualified staff is indispensable, it was not a sufficient condition to the assurance of better learning outcome. Ekanem and Ekpiken [18] in their study recommended that qualified university staff should be effectively utilized for greater efficiency in the university system. Although this study was done in universities which fall in another level of education system, the fundamental principles of cost cannot be overlooked. The study suggests that by engaging qualified staff, cost implications are obviously higher. It notes that this does not necessarily translate to better learning out comes. At the secondary school level, this ideas can be borrowed when analyzing and finding the link between cost per student (unit cost) and academic performance.

It was reported by Hanushek, Mayer and Peterson [19] that in 12 studies on expenditure per pupil in developing countries, half were statistically significant, and the other half were found to be statistically insignificant. Whether secondary schools endowed with more financial resources do better than those less endowed, remains issues which require exploration in developing countries. The question arise, is unit costs fundamental in contributing to secondary school performance? Are changes in secondary school unit cost consistent with changes in academic performance and how do they relate?

Nafukho [20] carried out a study to uncover the optimal size of secondary schools in Kakamega district as Kosgei and Rono [21] undertook a study to determine the optimal size and cost efficiency of Nandi district secondary schools, Musoga [22] carried out a study on cost saving measures in public secondary school in Kakamega district. In addition to these studies, Ngetich *et al.*, [1] determined unit cost in secondary school in Nandi County. These studies did not attempt to establish link between cost per student (unit cost) and student's academic achievements. The current study therefore designed to fill the gap by analyzing the influence of unit cost on learners' academic performance in the types of secondary school in Nandi County, Kenya. By filling this gap, the study would donate to the body of knowledge available on this subject. The Purpose of the Study was to examine the influence of Unit Cost on academic performance of learners in Day and Boarding secondary schools in Nandi County, Kenya. This study was set to achieve the following objectives:

- To establish enrolment, variable cost and unit cost of Day and Boarding secondary schools in Nandi County, Kenya.
- To examine the influence of unit cost on academic performance of learners in Day and Boarding secondary schools in Nandi County, Kenya.

This study tested the following hypotheses:

HO1: There is no statistically significant relationship between Unit cost and academic performance of learners in boarding secondary schools in Nandi County, Kenya.

HO2: There is no statistically significant relationship between Unit cost and academic performance of learners in Day secondary schools in Nandi County, Kenya

The underlying reason for this study was the fact that the budgetary allocation to education sector has been increasing in the recent past. With enormous resources allocation to the secondary school sub-sector, performance of learners in the national examinations is expected to respond in equal measure. The information resulting from the findings of this study contributes to the evolving body of research on how optimally we should allocate resources in educational institutions in general and at the secondary school level in particular; so as to yield positive impact on learners' academic performance. This study was delimited to public secondary schools in Nandi County, Kenya. The study dealt with Unit cost and academic performance for the period between 2012 and 2015. Unit cost was determined using annual recurring expenditures only. The study was limited to analysis of the influence of Unit Cost on learners' academic performance. Thus, the study did not measure the contribution of other factors to learners' academic performance such as intelligence quotient, social economic status, peer group effects, community level factors and family background. This study was guided by Cost Function derived from the Education Production Function theory [23]. Psacharopoulos and Woodhall [24] put forward that Production Function Theory considers production as the process that transforms inputs into outputs. The inputs of education process which can be traced to the output (graduate) of the education process have cost implication. The cost implication can then be traced to an individual student in a year (unit cost/cost per student).

MATERIALS AND METHODS

The study was conducted in Nandi County of Kenya. Nandi County is in North Rift of Kenya; occupying an area of 2,884.4 square kilometers with its headquarters as Kapsabet town. It is geographically bound by the equator to the south and extends northwards to latitude 0034'N. The western boundary extends to longitude 34045'E, while the eastern boundary reaches longitude 35025'E. This study employed a mixed method design which is an approach that associates both qualitative and quantitative forms [25]. Mixed method involves the use of both qualitative and quantitative research designs together so that the overall strength of a study is greater than either qualitative or quantitative research [26]. This study employed survey research as a research strategy. This study targeted all the principals of all the public secondary schools in the Nandi County, Kenya. At the time of collecting data, there were 186 public secondary schools in Nandi County.

In this study, the sample size was determined by use of the published table by Krejcie and Morgan [27]. The table was therefore suitable in determining sample size from a given population which was finite (known). Information available at the office of the Nandi County Director of Education indicated that the County had a total of 186 secondary schools in the year 2015. Based on the table by Krejcie and Morgan [27], a population of 186 secondary schools yielded a sample of 123 secondary schools. Stratified random sampling was adopted to identify the sample. To identify individual secondary schools which were visited for data collection, systematic random sampling was done separately for each of the two types of secondary schools. This study used both questionnaire and document analysis as tools of data collection. A questionnaire is a technique of data collection which consists of questions printed in a specific order on a structure where respondents respond to [28, 29]. According to Kothari [28] questionnaire method of data collection is at the heart of a survey process. The selection of this tool was informed by the nature of data collected, the number of respondents, time which was available and the objectives of the study. This instrument was also cost effective and could enable easy coding and analysis of information collected [30]. This study used both closed and open ended questionnaire which was developed in consultation with research supervisors and colleagues to capture data on enrolment, levies charged by the school other than what is in the fees schedule, performance in KCSE examinations.

In addition to the questionnaire, this study used document analysis for data collection. In this study, the sources of documentary data used included fees guidelines from the MoEST, school fees structures, school financial statements and data on KCSE scores; these documents were found complete, in correct form and adequate. Other documents included circulars from the Ministry of Education on the free Day Secondary Education. These documents were analyzed for information relevant to this study. KCSE performance for the schools visited were analysed to corroborate information collected in the questionnaire. From yearly income and expenditure accounts, actual cost incurred for each vote head and total cost were used to calculate yearly unit cost in each of the years, 2012 to 2015. Validity of the research tool for this study was determined by having experienced team of supervisors and researchers in the School of Education-Moi University, who carefully and critically examined the questionnaires to evaluate the exactness of the items contained in the two instruments. In view of their

suggestions, the research instrument was revised to remove any ambiguity, errors and add any omissions, weight and clarity before administering the instruments to the respondents.

The reliability of the questionnaire and document analysis which were the instruments for this study was tested through a pilot study which was carried out in Uasin-gishu County. This study therefore borrowed from the advises of Shaughnessy, Zechmester and Zechmester [31], who posit that a pilot study may be carried out in a location that does not form part of the main research. In the pilot study test-retest technique was used in determining the reliability. Using the two sets of scores, Pearson Product Moment correlation Coefficient (r) was computed to establish the extent to which the instruments gave consistent measures. The pilot study yielded reliability coefficient of 0.807; thus the instrument could be adopted. This study deployed the usefulness of the Statistical Package for Social Science (SPSS) version 20 for data analysis. Percentages, means and linear regression was used to analyze and present data. The two null hypothesis (HO_1 and HO_2) was tested using linear regression analysis. Linear regression was used to determine relationship between unit cost and academic performance. In this study, ethical issues were considered before embarking on research; informed consent was obtained, all the respondents remain anonymous and confidentiality of the information was assured.

RESULTS AND DISCUSSIONS

Enrolment in Secondary Schools

In this study, enrolment in the sampled schools was one of the essential items for analysis; this study analyzed enrolment in terms of school type for the years 2012-2015. The result of this analysis is shown in Table-3 below.

Table-3: Enrolment Based on the Type of Schools (2012-2015)

Type of School	2012	2013	2014	2015	Average	Percentage
Day Schools	12,600	13,878	14,833	16,119	14,356	65.6
Boarding Schools	4,430	6,569	8,401	10,750	7,538	34.4
Total	**17,030**	**20,447**	**23,234**	**26,869**		**100**

From Table-3 above, Boarding Schools enrolled a total of 4,430 students in 2012, 6,569 students in 2013, 8,401 student in 2014 and 10,750 students in 2015. Yearly average enrolment stood at 7,538 students this being 34.4 percent of the total enrolment. On the other hand, Day secondary schools enrolled 12,600 students in 2012 and 13,878 learners in 2013. The numbers enrolled in Day schools rose to 14,833 and 16,119 for the years 2014 and 2015 respectively. For Day schools, yearly average enrolment stood at 14,356 this enrolment represented 65.6 percent of the total enrolment. From this it can be revealed that Day schools enrolled majority of the students in each of the four years under study. It can also be established that total enrolment in both school types increased by 57.7 percent from 17,030 students in 2012 to 26,869 students in 2015.

Determination of Variable cost

In order to determine unit cost, variable cost must be identified. In this study, analysis of variable cost for each of the years 2012-2015 is presented in Table-4.

Table-4: Yearly Variable Cost for the Period 2012-2015

Type of School	2012	2013	2014	2015	Totals	Average
Day Schools	272,223,000	272,813,724	335,151,635	406,102,086	1,286,290,445	321,572,611
Boarding Schools	214,881,580	306,640,920	495,238,950	700,652,750	1,717,414,200	429,353,550
Total	487,104,580	579,454,644	830,390,585	1,106,754,836	3,003,704,645	

From Table-4 above, it can be revealed that, Day schools spent Ksh. 272 million in the year 2012 rising to Ksh. 406 million in 2015. Day schools spent a total of Ksh.1.2 billion for the four year period (2012-2015), giving a yearly average expenditure of Ksh. 321 million. On the other hand Boarding secondary schools spent Ksh. 214 million in the year 2012 rising to Ksh. 700 million in 2015. Boarding schools spent a total of Ksh.1.7 billion for the four year period, giving a yearly average expenditure of Ksh. 429 million. In total, considering the two types of schools, total expenditure rose by 127 percent from ksh. 487 million in 2012 to Ksh. 1.1 billionin 2015.

Determination of Unit Cost

Table-5 below, analyses unit cost, for the period 2012-2015 in the two types of schools.

Table-5: Unit cost for the Two Types of Schools for the period 2012-2015.

Type of School	2012	2013	2014	2015	Average
Day Schools	21,605	19,658	22,595	25,194	22,263
Boarding Schools	48,506	46,680	58,950	65,177	54,828

Table-5 shows a summary of the findings of Unit Cost for the sampled schools for the period 2012-2015. From the Table it can be revealed that the Unit Cost for Day schools stood at Ksh. 21,605 in 2012, Ksh. 19,658 in 2013, Ksh. 22,595 in 2014 and Ksh.25,194 in 2015, giving an average Unit cost of Ksh. 22,263. This was the amount which was spent on average by the Day schools in the period 2012-2015 to provide education for each student. Furthermore, the study determined Unit Cost for Boarding secondary schools sampled for the study. In Boarding school, unit cost was Ksh. 48,506 and Ksh. 46,680 for the years 2012 and 2013 respectively. Unit cost further increased form Ksh. 58,950 in 2014 to Ksh. 65,177 in 2015. Therefore average unit cost for Boarding schools for the period 2012-2015 stood at Ksh. 54,828. Boarding schools spent the highest cost per student per year for the entire period 2012-2015.

Analysis of KCSE Performance for the School Types (2012-2015)

In this study, analysis of the performance at the Kenya Certificate of Secondary Education (KCSE) examinations according to the schools type for the years 2012-2015 was done. Learners were considered in the following types of schools; Day School or Boarding School. Table 6 below shows the results of this analysis.

Table-6: Summary Analysis of KCSE Performance for the School Types (2012-2015)

Schools type	2012	2013	2014	2015	Average
Boarding schools	6.9874	6.8956	7.1548	7.4358	7.1184
Day schools	4.8153	4.6334	4.9612	4.5464	4.7391

From Table-6, Boarding secondary schools sampled for the study recorded a mean score of 6.9874 in the year 2012, 6.8956 in the year 2013, 7.1548 for the year 2014 and 7.4358 in the year 2015. Day secondary schools recorded a mean score of 4.8153, 4.6334, 4.9612 and 4.5464 for the year 2012, 2013, 2014 and 2015 respectively. The average for the four years was a mean of 7.1184 for Boarding secondary schools and 4.7391 for Day secondary schools. It is important to note that, for all the years, Boarding secondary schools performed better than Day secondary schools. Furthermore, the highest mean that was attained in the four years was 7.4358 for Boarding secondary schools and 4.9612 for Day secondary schools.

The influence of Unit Cost on Academic Performance of Learners in the Types of Secondary Schools

Testing the Hypotheses

It was the concern of this study to determine the relationship between unit cost and academic performance of learners in Boarding secondary schools in Nandi County. Therefore the first hypothesis was stated as:

HO_1: There is no statistically significant relationship between Unit cost and academic performance of learners in Boarding secondary schools in Nandi County.

This hypothesis was tested using linear regression analysis. Using SPSS (version 20), a linear regression analysis involving unit cost and academic performance was used to determine the actual prediction equation and show the direction, collinearity and strength of the relationship among the variables. All the variables had items that were measured in ratio scale. To undertake multiple regression analysis, the responses in each variable were transformed into composite means using SPSS version 20 before generating the regression output. The components of the linear regression analysis used in this study are the Model Summary, the ANOVA Summary and the Table of Coefficients.

Table-7 presents the coefficients used in the linear regression equation, the t-statistics and the p-values derived after running the regression analysis using SPSS. This is where the actual prediction equation can be found. The regression equation used in this study was;

$$Y= \beta_0+\beta_1X_1$$

Where,
X_1 is unit cost,
Y is level of academic performance
β_0 is a constant implying the level of academic performance that does not depend on unit cost.
β_1 is the coefficient of proportionality for unit cost for Boarding schools

Table-7 Linear Regression of Academic Performance on Unit Cost for Boarding Schools

Table-7(a): Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
	school type = boarding (Selected)				R Square Change	F Change	df1	df2	Sig. F Change
1	.621[a]	.386	.364	1.447149	.386	17.573	1	28	.000
a. Predictors: (Constant), unit cost									

Table-7(b): ANOVA[a,b]

ANOVA[a,b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.803	1	36.803	17.573	.000[c]
	Residual	58.639	28	2.094		
	Total	95.441	29			
a. Dependent Variable: performance						
b. Selecting only cases for which school type = boarding						
c. Predictors: (Constant), unit cost						

Table-7(c): Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.040	1.803		-.022	.983
	unit cost	.621	.621	.621	4.192	.000
a. Dependent Variable: performance						
b. Selecting only cases for which school type = boarding						

In Table-7(a), R^2 was 0.386. R^2 is the coefficient of determination which shows the proportion of the variance in the dependent variable that can be explained by variation in the independent variables. Therefore 38.6% in the variation in academic performance can be explained by differences in the unit cost. The remaining 61.4% variation in the level of academic performance can be explained by other variables not covered in this study. Table 7(b) shows an F-ratio of 17.573 with degrees of freedom of 1 and 28, $p=0.000(p<0.05)$. In other words, the dependent variable can be predicted from the independent variable. This implies that there was a significant regression equation at 0.05 significance level.

Table-7(c) shows the coefficients used in the linear regression equation. Substituting the coefficients in the linear regression equation, we get:

$$Y=-0.040+0.621X_1$$

This implies that there was a positive significant ($p=0.000$) relationship between academic performance and unit cost in Boarding secondary schools where the study was done, $t(28) = 4.192$, $p<0.05$. This shows that 62.1% of the change in the level of academic performance is due to unit cost.

Similarly, the study sought to determine the relationship between unit cost and academic performance of learners in Day secondary schools in Nandi County. Therefore the second hypothesis was stated as:

HO_2: There is no statistically significant relationship between Unit cost and academic performance of learners in Day secondary schools in Nandi County.

This hypothesis was also tested using linear regression analysis. The components of the linear regression analysis used in this study are the Model Summary, the ANOVA Summary and the Table of Coefficients.

Table-8 presents the coefficients used in the linear regression equation, the t-statistics and the p-values derived after running the regression analysis using SPSS. This is where the actual prediction equation can be found. The regression equation used in this study was;

$$Y_1= \beta_2+\beta_3X_2$$

Where,
X_2 is unit cost,
Y_1 is level of academic performance
B_2 is a constant implying the level of academic performance that does not depend on unit cost.
β_3 is the coefficient of proportionality for unit cost for Day schools.

Table-8 Linear Regression of Academic Performance on Unit Cost for Day Schools

Table-8(a): Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
	school type = day (Selected)				R Square Change	F Change	df1	df2	Sig. F Change
1	.254[a]	.064	.054	1.174542	.064	6.263	1	91	.014
a. Predictors: (Constant), unit cost									

Table-8(b): ANOVA[a,b]

ANOVA[a,b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.640	1	8.640	6.263	.014[c]
	Residual	125.539	91	1.380		
	Total	134.178	92			
a. Dependent Variable: performance						
b. Selecting only cases for which school type = day						
c. Predictors: (Constant), unit cost						

Table-8(c): Coefficients[a,b]

Coefficients[a,b]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.533	.814		3.112	.002
	unit cost	.254	.254	.254	2.503	.014
a. Dependent Variable: performance						
b. Selecting only cases for which school type = day						

In Table-8 (a), R^2 was 0.064. This shows that 6.4% in the variation in academic performance can be explained by differences in the unit cost. The remaining 93.6% variation in the level of academic performance can be explained by other variables not covered in this study. Table 7 (b) shows an F-ratio of 6.263 with degrees of freedom of 1 and 91, p=0.014(p<0.05). In other words, the dependent variable can be predicted from the independent variable. This implies that there was a significant regression equation at 0.05 significance level.

Table-8(c) shows the coefficients used in the linear regression equation. Substituting the coefficients in the linear regression equation, we get:

$$Y_1 = 2.533 + 0.254X_2$$

This implies that there was a positive significant (p=0.014) relationship between academic performance and unit cost in Day secondary schools where the study was done, t(91) = 2.503, p<0.05. This shows that 25.4% of the change in the level of academic performance is due to unit cost.

Findings from the hypothesis tested indicates that there was a positive significant (p=0.014) relationship between academic performance and unit cost in Day secondary schools. The implication is that 25.4% of the change in the level of academic performance in Day secondary schools is due to unit cost. For Boarding secondary schools, there was also a positive significant (p=0.000) relationship between academic performance and unit cost. This means, in Boarding secondary schools, 62.1% of the change in the level of academic performance is due to unit cost.

This finding are in agreement with a study by Munda and Odebero [14] which was aimed at determining how costs relate to the academic performance of District and County schools. They found out that the unit cost disparities between County and District schools could explain the better students' performance in County schools. the findings of this study is also supported by a World Bank Report [9] which pointed out that one reason for the low quality of education in Africa is that expenditure per student (unit cost) is very low by world standards. CIDA [13] agrees to that and notes that, inadequate financial resources are often seen as the origin of poor quality education, limited access and retention. Although Hanushek [15] in his study on the impact of differential expenditures on school academic performance, found out that no systematic positive relationship between student achievement and per-pupil expenditures (unit cost), Hanushek's findings have been challenged by Hedges, Laine and Greenwald [16] in their meta-analysis of the effects of differential school inputs on student outcomes, reanalyzed Hanushek's work and they discovered that an increase in average spending per

pupil (unit cost) would significantly increase student achievement. Correspondingly, Crampton [17] notes that expenditures give the impression to be of substance when they lead to ability to acquire smaller classes and more experienced, highly educated teachers.

However, the findings of this study are not supported by other studies. Hanushek [10] found out that there is no significant relationship between school expenditure and students' academic achievement. A study by Sika, Gravenir and Riechi [12] on the impact of unit cost on academic performance of public secondary education in Siaya, Kenya, also concluded that an increase in unit cost may not lead to increase in performance. They caution that allocating more resources in the schooling process as a way of improving achievement need to be done with a lot of prudence. Furthermore, in Nigeria a study by Ayodele [9] on the relationship between private cost and students' academic performance in secondary schools found out that, there was no significant relationship between private unit cost per student of secondary education and students' academic performance in secondary schools in the state. Ekanem and Ekpiken [18] in their study found out that unit cost of both academic and non-academic staff could not establish the extent of students' academic attainment. However Picus [32] notes that inputs to learning outcomes usually include per-pupil expenditures (unit cost) while Hanushek [33] emphasize that this inputs have a constructive effect on student achievements.

CONCLUSION

This study found out that the dependent variable could be explained by variation in the independent variable. Thus the variation in academic performance could be explained by differences in the unit cost. However 61.4% variation in the level of academic performance can be explained by other variables not covered in this study. The study therefore revealed that there was a positive significant relationship between academic performance and unit cost in Boarding secondary schools. On the other hand, it was found out that 6.4% in the variation in academic performance for Day schools could be explained by differences in the unit cost. The remaining 93.6% variation in the level of academic performance could be explained by other variables not covered in this study. It therefore follows that, there was a positive significant relationship between academic performance and unit cost in Day secondary schools where the study was done. This shows that 25.4% of the change in the level of academic performance was due to unit cost. For Boarding secondary schools, there was also a positive significant relationship between academic performance and unit cost. This implies that in Boarding secondary schools, 62.1% of the change in the level of academic performance is due to unit cost.

Based on the findings of this study, the following recommendations were made: there is need to priorities expenditure so that there is appropriate allocation of financial and other resources for acquisition of teaching and learning resources and thus enhance learner achievements. The Ministry of Education and the School Management Board should continuously explore cost effective measures to reduce unit cost of secondary education so as to improve access and performance. Prudence will remain a guiding principle if we are to get value for the enormous resources going to secondary education sub-sector. The following are the areas that need further research: A study on predictive strength and direction of other factors other than unit cost affecting learner achievements in secondary schools. Suggested factors include class size, entry behaviour, and teacher and student attitudes teacher experience and teacher qualification. A study on the availability, magnitude and contribution of fixed assets towards learner achievements in secondary schools. Suggested fixed assets include land, machinery, plants among other fixed assets that the schools are endowed with.

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