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Effect of Physical Facilities on Academic Achievement in Public Day Secondary Schools in Kakamega East Sub-County, Kenya

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Abstract
In Kakamega East Sub-County, a majority (76%), of candidates from public day secondary schools scored below average of C in the Kenya Certificate of Secondary Education (KCSE) examination in the period 2010-2014. The purpose of the study was to find out if the low academic achievement was related tophysical facilities. Descriptive cross-sectional survey research design was used with a target population of 24 school principals. Stratified random sampling was used to select a sample size of 70% from the two educational zones while purposive sampling was used to select school principals and one Sub-County Quality Assurance and Standards Officer. Data was collected through document analysis, self-administered questionnaire, semi-structured interview and observation schedule. Qualitative data was reported in form of quotations and narrations followed by thematic analysis. Quantitative data was analyzed by use of percentages, cross tabulation and correlation. The study findings indicated that public day schools hadinadequate classrooms, Science laboratory and library facilities due to shortage of funds. Consequently, insufficient physical facilities had a high positive correlation with low academic achievement in the KCSE examination. The study recommended that more effort be expended on provision of classrooms and Science laboratories in order to enhance academic achievement.

Keywords: Achievement, Facilities, Kakamega, Public, Schools

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I. INTRODUCTION

In the United States of America, learning conditions within some schools in the state of Miami are adversely affected by insufficient funding. They receive $ 4,800 per student which is around half of what is disbursed to more affluent areas (1). The schools have insufficient learning materials, overcrowded classrooms, sub-standard buildings, insufficient bathroom facilities. They exhibit lower academic scores than newer well equipped schools (2). In developing countries lower academic achievement is mainly attributed to severe inadequacy of textbooks, dilapidated or overcrowded buildings, poorly ventilated classrooms and inadequate classrooms (3). The situation is linked to resource constraints(4). The government funds are inadequate and unreliable which adversely affects the provision of physical facilities and learning materials (5).

In Ghana, low academic achievement hinders access to higher education and training. Just 1.16% of students from impoverished schools with limited academic facilities joined the University of Ghana and the University of KwamehNkurumah in 2007 against 11% from schools with modern academic facilities. And less than 30% of doctors, engineers and pharmacists emanated from ill-equipped schools (6).

In Kenya, financial constraints in secondary schools negatively affect provision appropriate learning environment(7). Such low quality learning environment causes low academic achievement and limits the students' chances of transition to higher education and training (8). The Kakamega County Education Task Force (2014) noted that the County still experienced low academic achievement in the Kenya Certificate of Secondary Education (KCSE) examinations leading to high wastage among the form four leavers(9).The current state of low academic achievement in public day secondary schools (PDSS) precipitated the need to establish the relationship between funding for educational resources and academic achievement.

1.1 Statement of the Problem

The implementation of Free Day Secondary Education (FDSE) in Kenya in the year 2008 indicated a major step towards enhanced funding for quality learning environment and improved learning outcomes. However, in the period 2010-2014, academic achievement within public day secondary schools (PDSS) in Kakamega East Sub-County was below the average grade of "C" plain (6 points). A majority (76%) of candidates presented by PDSS scored between grades "C minus"(5 points) and E (1 point) in the KCSE examination, whereby the maximum score is "A" plain (12 points) while "E" (1 point) is theleast score.

Accordingly, the objective of this study was to find out whether or not the level of funding for physical facilities affected academic achievement in public day secondary schools.

1.2 Conceptual framework

Figure 1.1 shows the conceptual framework. Independent variables include; classrooms, Science laboratories and libraries. Academic achievement is the dependent variable, GoK policy is intervening variable.

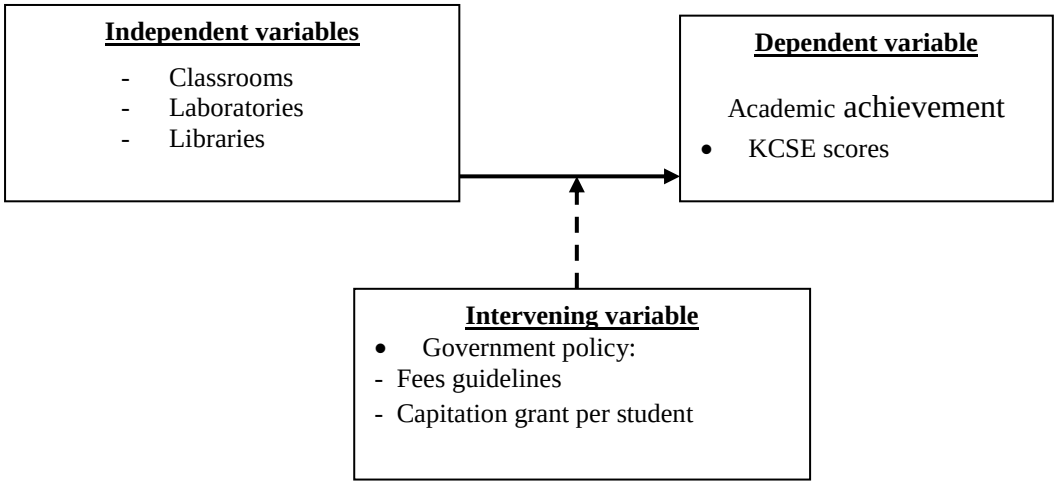

Figure 1: Conceptual framework

II. EMPIRICAL REVIEW

2.1 Funding physical facilities and academic achievement

A number of public day secondary schools (PDSS) in Sub-Saharan Africa (SSA) are characterized by lack of or inadequate physical facilities mainly due to insufficient funds (10). Studies in Tanzania, Malawi and Mozambique indicate that public day schools or community day secondary schools exhibit low academic achievement in national examinations. In Tanzania, over 89% of "O" level candidates from community day schools scored between division III and division IV in national examinations in 2011. The dismal achievement was attributed to shortage of infrastructural facilities, large class sizes of up to 60 pupils per class and inadequate funds for school programs (5). In Moshi District, community day secondary schools had difficult learning environment. A majority of the schools lacked libraries, did not have equipped science laboratories and the classrooms were deficient (11). In Malawi, 90% of students from community day secondary schools failed to pass the form four national examinations. The day schools had severe shortage of physical facilities due to gross under-funding(10). In Mozambique, the community day schools had unsatisfactory academic results due to an extremely poor learning environment. Schools in Nampula region did not have classrooms, lacked furniture, functional libraries, laboratories and had poor or non-existent bathroom facilities (12).Consequently, "The research is conclusive: school facilities have a measurable impact on the achievement of our children" (13).

2.2 Funding physical facilities and academic achievement in Kenya

Five studies in Nyeri South, Nyamira County, Yatta District in Machakos County, Kisii Central District andBungoma South Sub-County indicate that there could besome association between adequacy of physical facilities and academic achievement in public secondary schools.In Nyamira County, a descriptive survey revealed that 67% of the public day schools had inadequate classrooms, 62% lacked sufficient sanitation facilities while 96% did not have enough desks (14). Schools in Eastern Kenya have severe shortage of physical facilities. A survey in Yatta District found that in 50% of the sampled schools teachers shared toilets with students, 50% had one toilet for boys and one toilet for girls, while 69% had insufficient classrooms (15). In Nyeri South, school principals argued that the difficult learning environment due to gross inadequate of physical facilities produced low academic achievement in national examinations (16). In Bungoma South, schools with adequate physical facilities were academically superior to under-resourced schools. Schools with deficient classrooms, non-equipped libraries and laboratories with insufficient materials recorded bigger negative deviations in the KCSE examination results in the period 2006 to 2009. Interviews with school principals indicated that the status of physical facilities influenced academic achievement in the KCSE(17). The five studies had a common conclusion that inadequate classrooms, Science laboratories, libraries and bathroom facilities produced low academic achievement in the KCSE examinations. The current study sought to establish

the relationship between physical facilities and academic achievement in the KCSE with specific reference to public day secondary schools in Kakamega East Sub-County.

III. METHODOLOGY

The research design used was a descriptive cross-sectional survey. A cross-sectional survey involves collection of data from a section of the target population at a single point in time (18), and allows capture of opinions on the topic of study (19).In the study, data was collected once and used to establish the status of physical facilities in relation to academic achievement. The area of study was Kakamega East Sub-County. The study targeted 24 day schools that had presented candidates for the KCSE examination for at least 4 years. The target population comprised of 24 principals and one Sub-County Quality Assurance and Standards Officer, (20). Purposive sampling was used to select school 17 principals (70%) and one SQASO. Three research instruments were used in the study; a self- administered questionnaire and a semi-structured interview were used to collect primary data while secondary data was gathered through document analysis. The combination of the three data collection methods aided in collection of adequate in-depth data, reduced researcher bias in the findings and complemented each other where one method could not adequately address all the facets of the issue(8). The face validity was ascertained by the input of experts in the School of Education of Mount Kenya University and the tools were piloted to test the content validity in two public day secondary schools that were picked randomly. Reliability of the tools was established using the split half reliability approach. The tools yielded a reliability index of 0.76 which was taken as satisfactory(21).

IV. THE FINDINGS

4.1 Respondent demographics

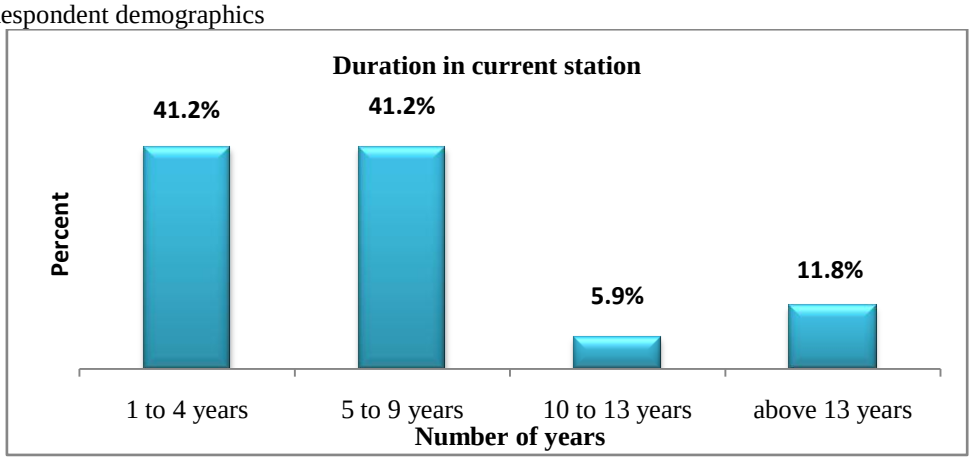

Figure 2: Principal's duration in the current station

According to the findings in Fig 2, a majority of the school principals (60%) had stayed in the current stations for at least five years (2010-2014),a period ofunsatisfactory academic achievement. Therefore, they provided adequate information in relation to academic achievement in the KCSE examinations. The SQASO had worked in the area for five years, therefore was well versed with issues affecting academic achievement in public day secondary schools within Kakamega East Sub-county.

4.2 Classrooms and academic achievement

(i) Adequacy of classrooms

The results from the observation schedule and interviews with school principals indicated that a majority (76.5%) of the schools had shortage of classrooms. According to the respondents, shortage of classrooms negatively affected learning during the rainy seasons by causing disruptions. This in turn reduced contact time for the teaching and learning process. Congested classrooms reduced the teacher's individual attention for each learner and adversely affected understanding of concepts by learner. The principals argued that shortage of funds made the physical appearance of schools unattractive. Such schools did not attract top performers from primary level and mainly ended up with many low achievers who were unlikely to attain top grades in the KCSE examinations. In addition, the SQASO affirmed that classrooms contributed tothe quality of learning environment and academic achievement.

In terms of quantity the classrooms may be sufficient to some extent; there is no serious shortage of classrooms in day schools. However, the existing facilities may not be complete to the required standards (**SQASO, Kakamega East Sub-County**).

(ii) Correlation between number of streams and KCSE scores

Table 1: Correlation: Streams vs KCSE scores

		KCSE
KCSE results	Pearson Correlation	1
	Sig. (2-tailed)	
	N	17
Number of streams	Pearson Correlation	.742(**)
	Sig. (2-tailed)	.001
	N	**17**

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

The findings in Table 1 indicate a high positive 2-tailed Pearson correlation, = 0.742 between the number of classrooms and examination results in the Kenya Certificate of Secondary Education (KCSE). The p-value of 0.01 that is less than 0.05 indicates that the relationship is statistically significant in both directions. That is, shortage of classrooms could be associated negatively with academic achievement in the KCSE examinations.

(iii) Cross tabulations: number of streams and KCSE scores

The cross-tabulation in Table 2 confirmed that schools with more streams (classrooms) performed better than schools with lower number of streams in the Kenya Certificate of Secondary Education (KCSE) examinations.

Table 2: Cross tabulation: KCSE results vs Streams

		number of streams in school			Total
		1.00	2.00	3.00	
KCSE	fair	0	7	2	9
	low	5	3	0	8
Total		5	10	2	17

Inferred from Table 2, 100% of single streamed schools had low academic achievement, 70% of double stream and 100% of triple stream schools performed better than single stream schools in the KCSE. It could be inferred that schools with three streams had more facilities which made them prepare students better for the KCSE examination hence better test scores. The interpretation here would the government funding is pegged on enrolment, schools with higher enrolment receive a higher funding. Therefore, schools with higher enrolment are able to afford more facilities that translate into better learning outcomes.

4.3 Science Laboratories and academic achievement

(i) Adequacy of Science laboratories

The findings from the observation schedule and interviews with school principals indicated that 6% of the schools did not have a Science laboratory while 76.5% insufficient and under-supplied laboratory facilities.

(ii) Correlation between Science laboratory facilities and KCSE results

The findings in Table 3 indicate correlation between the quantity of laboratory facilities and academic achievement in the KCSE examinations.

Table 3: Correlation; laboratory facilities vs KCSE results

		Lab numbers	KCSE results
Lab numbers	Pearson Correlation	1	.574(*)
	Sig. (2-tailed)		.016
	N	17	17

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

The results in Table 3 show that there is a high 2-tailed positive correlation (0.574) between laboratory facilities and KCSE results. The p-value of 0.016 which is less than 0.05 indicates that the positive correlation is statistically significant. Consequently, it can be concluded that reduction in laboratory facilities is likely to cause low academic achievement in the KCSE examinations, the converse is true.

(iii) Cross tabulation between laboratory facilities and KCSE results

The results in Table 4 were affirmed by the cross tabulation between the number of laboratories and Kenya Certificate of Secondary Education (KCSE) scores as illustrated in Table 4.10.

Table 4: Cross tabulation; Science laboratory facilities vs KCSEscores

		Number of laboratories			Total	Percentage
		.00	1.00	2.00		
KCSE	Average performance	0	3	1	4	23.5%
	Low performance	2	8	3	13	76.5%
Total		**2**	**11**	**4**	**17**	

From the cross tabulation in Table 4, it is inferred that over three quarters of the schools with low academic achievement had either non-existent or inadequate laboratory facilities. Therefore, academic achievement was associated with availability and adequacy of laboratory facilities. In which case, schools with sufficient laboratory facilities performed better than schools with insufficient and under-equipped laboratory facilities. A majority of the respondents felt that inadequate, non-existent or ill equipped Science laboratories led to insufficient exposure to practical skills. Consequently, 100% of the respondents affirmed that inadequate Science equipment and materials could cause low academic achievement in the KCSE examinations.

The SQASO affirmed thatScience laboratory facilities had a significant role in the KCSE academic outcomes;

Definitely, lack of Science laboratories leads to ineffective teaching of practical lessons; the students mostly do practical sessions during external examinations like the KCSE which produces low academic achievement (**SQASO, Kakamega East Sub-County)**

Basing on the findings from correlations (0.574, p-0.016) and cross tabulations, the researcher concluded that laboratory facilities were strongly linked to academic achievement in the KCSE examinations. These findings further confirm the findings in Tanzania by Komba et al (2013) and Kimeu et al (2015) in Makueni County that schools with poor academic achievement had insufficient laboratory facilities.

4.4 Library facilities and academic achievement

(i) Availability and adequacy of library facilities

The findings on the status of library facilities from the observation schedule and interviews with school principals indicated that library facilities in over 90% of the schools were either inadequate or non-existent. Only 6% had a well-equipped library, 47% had under-resourced libraries while in another 47% the library building or resources were non-existent.

(ii) Correlation between library facilities vs KCSE scores

Table 5: Correlation; Library vs KCSE scores

		KCSE scores	Enough libraryFacilities
Arelibrary facilities enough?	Pearson Correlation	.387	1
	Sig. (2-tailed)	.062	
	N	17	17

The results in table 5 show that there is a positive correlation between library facilities and KCSE scores as illustrated by the Pearson's correlation of 0.387. On the other hand, the p-value of 0.062 is greater than 0.05 which shows that the correlation is not statistically significant. The results led to the conclusion that there could be other factors that influence academic achievement in tandem with library facilities.

(iii) Cross tabulation between library facilities and KCSE results

Table 6: Cross tabulation; library facilities vs KCSE results

		Library is well stocked		Total	Percentage
		No	Yes		
KCSE	Average performance	4	0	4	23.5%
	Low performance	10	3	13	76.5%
Total		14	3	17	100%

It could be inferred from Table 6 that over three quarters of the schools with low academic achievement had ill equipped libraries which could be negatively associated with low performance in the KCSE. The principals felt that insufficient course books and revision materials in the library reduced students' access to and contact with resource materials. The students could not develop a reading culture that was necessary for scoring top grades in the KCSE examinations without sufficient reference resources. In which case, the learners'

individual studies could not be done adequately in order to supplement the teacher's work. This view was affirmed by the Sub-County Quality Standards and Assurance Officer thus;

Insufficient or poorly equipped library facilities causes lack of reading skills and reading culture among students; this added to lack of reference materials leads to low academic achievement (**SQASO, Kakamega East Sub-County)**

Related findings were obtained by a World Bank (2012) study in Nampula region in Namibia, Muindi (2012) in Nyeri South, Moranga (2013) in Nyamira and Mutisya (2011) in Eastern Kenya that poor academic results at secondary level were associated with inadequate classrooms, dysfunctional libraries or under-equipped Science laboratories.

V. SUMMARY

Physical facilities in most schools were not adequate due to insufficient funds. Classrooms and Science laboratory facilities had a significant positive correlation (0.743, p-value 0.01) and (0.574, p-value 0.016) respectively with academic achievement. On the other hand, library facilities did not have a weak positive correlation (0.387, p-value 0.062) with academic performance. As a result, a deficit in physical facilities contributed to low academic achievement in the KCSE.

VI. CONCLUSION

A majority of the public day secondary schools have inadequate physical facilities such as Science laboratories and classrooms. And this inadequacy was associated with the unsatisfactory achievement in the Kenya Certificate of Secondary Education examinations.

VII.RECOMMENDATIONS

Since there has been established a strong positive correlation between facilities and academic achievement, more effort should be expended in finding ways of providing these facilities ifdesirable learning outcomes are to be realized public day secondary in Kakamega East Sub-County. The study alsorecommends further researchon the effect of physical facilities on academic achievement in specific areas such as Sciences.

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