

Influence of availability of physical facilities on quality of education in public day secondary schools in Embu County, Kenya

Simon Muchira Mbogo, Dr. Khatete Ibrahim and Prof. Akala Jumba

Department of Educational Administration and Planning, University of Nairobi

Abstract

Quality education has been identified as the driving tool for all forms of development. For this reason provision of quality education has been and continues to be of great concern in education development agendas with the focus to improve on test scores, rates on enrollment, completion, participation and reduce the dropout and grade repetition rates. The intent of the study was to examine the influence of availability of physical facilities on quality of education in public day secondary schools in Embu County Kenya. The study adopted correlational research design targeted the 192 public secondary schools in Embu County. Stratified random sampling and purposeful sampling were adopted in selecting 35 principals, 97 teachers and 384 form four students-all drawn from 35 public day secondary schools. Instruments of data collection were questionnaires, interview schedule and an observation checklist. Data was analyzed both quantitatively and qualitatively. Quantitative data was analyzed descriptively using frequency tables and their percentages and correlation tables. Qualitative data was analyzed based on the meaning and opinions of the respondents. Some narrative responses from the interview with principals were transcribed and presented in raw form. Chi-square statistics were computed at $\alpha=0.05$ to enable the researcher to make inferences with regard to significance of the relationship between the variables. The findings of the study revealed that physical facilities were inadequate in public day secondary schools. A majority of schools classes were overcrowded; only 4.3 percent of schools had a library, 62 percent of double streamed schools offering three science subjects had one laboratory. Only 3.3 percent of schools had access to internet facility. The study established statistical significant relationships between physical facilities and quality of education. The study recommended that the government should increase the maintenance and improvement fund under the FDSE to enable the schools to acquire, expand and maintain the school physical facilities. The government should also take upon her to connect schools with internet.

Key words: physical facilities, quality education, dropout rate, repetition rate, completion rate, enrollment rate, academic performance.

Date of Submission: 07-06-2022

Date of Acceptance: 22-06-2022

I. Introduction

School physical facilities comprise define the physical learning environment. Researches have demonstrated that the physical learning environment have great influence in the realization of educational goals. Thus the need for adequate, relevant and well-maintained physical facilities cannot be underestimated in any effort to improve test scores, increase enrollment and completion rates and in reduction of grade stagnation and dropout rates. Nwaogu (2015) argue that however productive the teachers may be, quality education cannot be achieved in an uncondusive physical learning environment. As such educational goals should be set with physical facilities in mind (Adesina and Ogunsanji, 2014). Ajayi, Audu and Ajayi (2017) observe that less learning takes place in overcrowded classrooms. This is because it is difficult for teachers to control students and the teacher is limited by time and space to offer individualized attention. As a result students learn less and or may achieve poor test scores which curtail the student from progressing to the next grade. According to Jepchirchir (2019) inadequate classrooms limit the school capacity to enroll more students as there are not enough spaces to take in all students. Singolyo and Ngussa (2019) observed that lack of secure toilets negatively affect self-esteem of the students leading to feeling of inferiority and frequent absenteeism. Students become uneasy in asking and answering questions in class thereby affecting their participation. In the end academic performance deteriorates. Some students also contemplate withdrawing from school all together. Alam and Kaneko (2019) indicated that availability of electricity in schools lengthen study time resulting to better academic scores that enable the student to be promoted to the next grade. Meanwhile Jackoski (2013) observe that availability of electricity reduced chances of student being engaged in domestic chores. In one such a case

the installation of solar power in Sudan enabled the thrusting of water from boreholes thereby sparing time for students to study and revise for examinations. According to a report by the Asian Development Bank (2020) only 25 percent of secondary schools in Viet Nam had adequate, quality and relevant physical facilities. In the rest of the schools libraries, laboratories and classes were inadequate, old and unmaintained. As such too many of the possible student population in lower and upper secondary were out of school since the inadequate facilities could not meet the demand for education from the student rising population. The absence of school laboratories hinders the learning through practical activities in science subjects and which greatly impedes the acquisition of the intended skills and knowledge (Chepkonga, 2017).

Under the free day secondary education in Kenyan the maintenance and improvement funds being part of the student capitation is meant to acquire and or maintain the school physical facilities. Despite the efforts public day secondary schools continue to face the challenge of inadequate physical facilities. The intent of the study was to analyze the influence of availability of physical facilities on quality of education in public day secondary schools in Embu County.

Statement of the problem

The Kenyan government acclaims the importance of quality education in all forms of development just as it is envisaged in the sustainable development goals. In this regard the government put some measures in place with a focus to improve on quality of education. The measures include increasing student's capitation from 12,870 to 22,244 and engaging internship teachers and recruiting more teachers to ameliorate teacher shortage. The government also continues to offer bursaries to the very vulnerable. The Kenya Education Management Institute which is a government institution offers training to school managers with a focus to improving their capacity to manage schools. Despite these efforts the quality of secondary education remains low. Statistics of the Kenya ministry of education (2019) show that in 2014 and 2016 the number of students that enrolled in forms one in Embu County were 12,099 and 12,885. The number of students that registered for the final examination after 4 years in 2017 and 2019 were 10,653 and 11,593 respectively. The data indicates of cases of dropout and or grade repetition. The mean scores in the Kenya Certificate of Secondary Education for the period 2019-2019 were 3.7, 3.45, 3.98, and 4.29 (Kenya National Examination Council). In the same period the percent of students who scored grade of C+ and above were 17.4, 14.4, 16.1 and 20.2 respectively. The data shows the unsatisfactory quality of secondary education in Embu County.

Research objective

The study objective was to determine the influence of availability of physical facilities on quality of education in public day secondary schools in Embu County, Kenya.

Null hypothesis

There is no significant relationship between availability of physical facilities and quality of education in Public day secondary schools in Embu County, Kenya.

Theoretical framework

The study was modelled on the Education Production Function theory. The theory was actuated in examining the influence of educational inputs on educational attainment of learners in the United States (Coleman, 1966) . According to this theory education is an industry which processes educational inputs into educational outputs. The inputs may include physical facilities, teachers, and finances, instructional materials among other inputs while the process refers to the teaching and learning activities. Much research work has used test scores to gauge the quality and efficiency of education. However others such as the OECD (2007), UNESCO (2005) and World Bank (2008) have used additional parameters such as enrollment, completion, drop out and repetition rates among others. This implies that there is no consensus on which input has specific influence on a given output (Percel & Menaghan, 1994). Education production function theory can be defined as

$Q = f(a, b, c, d \text{ and other inputs})$ where

Q is the educational outputs and a, b, c, and d represents inputs such as availability of physical facilities, number of teachers, availability of teaching and learning materials, and finances. From the definition the amount and quality of inputs determines the amount and quality of outputs. However this is subject to the efficiency and effectiveness of the process. The Theory was appropriate for the study in determining how educational resources influence quality of education in public day secondary schools in Embu County, Kenya.

II. Literature Review

The design and layout of the context under which teaching and learning take place is defined by the number, the relevance and the quality of the physical facilities available to a learning institution. They include but not limited to classrooms, offices, laboratories, libraries, toilets, electricity, internet, land and water among others. According to the Republic of Kenya (2005) the educational attainment of the learner is, to a great extent, profoundly determined by the sufficiency of school facilities, how well and appropriately they are designed, and

their status or condition in readiness for use. In the views of the Development Bank of Latin America (2016) fitting, adequate, secure and comfortable facilities are obligatory in improving test scores, enrollment, and completion rates and reduction of repetition and dropout rates as well. These assertions are supported by various studies around the globe.

Marzoli and Papa (2017) in Italy observed that students in schools with functional libraries had comparable better test scores than their counterparts in schools without libraries and those in small and or poorly equipped libraries. The study found that the mathematics and Italian language test scores in INVALSI test for students in schools with functional libraries were 49 and 64 percent respectively while for their counterparts in schools without libraries or small and or poorly resourced libraries were 43 and 58 percent respectively. Students who gainfully utilize a variety of reading materials in functional libraries have a better chance to improve their reading skills that promote their level of comprehension. These views are backed by the position of the World Bank (2008) that the outcomes of a functional school library is the ability to access the required information to widen the scope of understanding all the curriculum subjects. Considering exam failure rate as an indication of poor quality of education, a study by Leo (2016) in Tanzania found that students in schools with library had a lower failure rate than those in schools without libraries. For the school years 2012-2014 failure rates of students in schools with libraries were 2.9, 3.1, and 4.4 percent respectively compared to failures rates of 37.4, 35.2 and 32.8 percent respectively in schools without libraries. The studying environment in libraries is without interruptions; it is quiet and allows one to concentrate especially when doing assignments or revising for exams and with access to text books and other supportive materials. The library reading materials supplements and widens the scope of the content in class texts.

The need for school laboratory in improving the quality of education cannot be overstated notably in the learning of science subjects. A quasi-experimental study by Shana and Libdeh (2020) in United Arab Emirates found that the pretest scores for the experimental and control group had no any significant difference. The experiment group was then taught chemistry and biology in the laboratory and carried out intensive experiments in the laboratory on the two domains. The control group was taught the same content in the two subjects in the usual classroom situation without going to the laboratory for experiments. Upon evaluation of the posttest scores of the experiment group were comparably better than those of their counterparts in the control group. Hodson (1990) argue that laboratory experiments inspire and give motivation to the learners. Experiments also do create the curiosity to acquire the knowledge in sciences which in turn enhance critical thinking.

One problem that is encountered in schools with inadequate classrooms is overcrowded and or rather large class-sizes. In a study by the National Center for Research into Basic Education (2017) in northern Ghana overcrowding of students in classes contributed to grade repetition and school dropout in both primary and secondary schools. The class sizes were as big as 84 and 96 students in primary and senior secondary respectively and 63 in junior secondary. The growth in population and rising demand for education was not in tandem with acquisition and expansion of school facilities. In overcrowded classes individualized instruction proves difficult for the teacher which would help the slow learners and those at risk of dropping out of school. The unavailability of enough space for the teacher limits the use of the appropriate pedagogy for effective content delivery. These limitations erode the motivation to work hard and the interest for schooling. In a similar study by Ramli and Zain (2018) in Malaysia found that there was so much noise in overcrowded classes at Peng Kalan Chepa campus which was worsened by the noise from the surrounding environment within the city where the campus was located. The study established that this had adversarial impacts on students test scores. Noise disrupts communication between the teacher and learner. The sitting position and posture in congested classes may make it difficult for one to take/write notes during the lesson. Lesson notes are important for reference particularly when doing assignment and when revising for exams.

Investing in school water and sanitation has been found to have positive impact on enrollment and reduction of school dropout particularly for girls. In India 'School Sanitation and Hygiene Education' project that constructed 22,000 latrines in the year 2000 increased the number of female teachers, improved enrollment and reduced dropout rates especially for the girls (adukia, 2014). The study found that availability of school latrines enhanced their privacy with regard to their physiological needs. Girls are more likely to attend schools with a higher ratio of female teachers as they act as role model. Girls also feel more comfortable when divulging their privacy with female teachers (World Bank, 2001). Meanwhile a study by Hamza (2016) in Punjab, Pakistan found that two years after latrines were constructed in schools that had few of such facilities or had none, the enrollment in secondary schools increased from 5.3 percent in 2012 to 7.9 percent in 2014. The parents were apprehensive in enroll their children to schools without proper sanitation facilities due to fear of their security. Children are likely to drop out of school or fail to attend schools that lack latrines that can cater for their physiological needs. Elsewhere in Maseno, Kenya a study by Ochieng (2013) attributed poor academic performance of pupils to insufficient and poor state of school latrines. There were about six latrines per school a number that was far much lower to meet the recommended toilet to pupil ratio of 1:25 for girls and 1:30 for

boys. Pupils would queue for the few available latrines taking more time meant for class instruction. Those who could not access the facility would get anxious and stressed for withholding urine or stool. An anxious or stressed pupil cannot concentrate nor participate fully in class. There was also no water within the sanitation areas that pupils could use to wash their hands after visiting the toilets. Inadequate water and sanitation can easily breed disease causing microorganisms causing short illnesses affecting school attendance (Scotland's Commission for Children and Young people, 2013). Poor health and irregular school attendance works against the pupils' readiness to meet the requirement of the exams as they will not have covered adequate content.

III. Research Methodology

Research design

Kothari (2004) defines research design as the organization of how research data is obtained and analyzed with a focus to put together relevance to the aim of the research with the cost in mind. In other words it is the decisions regarding where, when, how much and by what means concerning a research. It is thus the blue print that guides data collection and analysis in research. The relevance of research design is informed by its applicability in the procedure of dealing with the research problem (Merriam, 1998). Correlational research design was employed in this study. The aim of a study that employs correlational design is to establish how change in a variable or variables cause change in another variable or variables and without controlling or manipulating variables (Creswell, 2012). The design is economical resource wise and time. Correlational research design was thus appropriate as the purpose of the study was to examine the influence of availability of physical facilities on quality of education.

Target population

Target population is the whole set of occurrences, group of people or items which are of interest to the researcher for investigation (Sekaran & Bougie , 2010). The items or individuals of the target population possess particulate attributes of interest and relevance to the aim of the research (Creswell, 2003). This study targeted 192 principals, 1743 teachers and 35124 students from all the 192 public secondary schools in Embu County (office of the county director of education, Embu County, 2019).

Sampling technique and sample size

Schools in Embu County were stratified into the five sub-counties: Embu East, Embu North, Embu West, Mbeere North and Mbeere South. Purposeful sampling was used to select Public day secondary schools and the form four students. Random sampling was then used to select participants from each Sub-County. The sample size for the students was calculated using the formula by Cochran (1963, 1975).

$$n = \frac{z^2pq}{d^2} \text{ Where,}$$

n is the desired sample size,

z is the standard normal deviation set at 1.96 which corresponds to 95 percent confidence level,

p is the proportion in the target population to have a specific attribute,

q is 1-p, and,

d is the absolute precision set at 0.05

Upon substitution;

$$n = \frac{1.96^2 (0.5)(0.5)}{0.05^2} = 384 \text{ students.}$$

Bullen (2014) opines that that a sample of 10 percent is high enough but should be at most 1000 individuals. Meanwhile McMillan and Schumacher (2001) argue that a sample size of 20 percent is adequate for small populations. Samples of 20 and 10 percent of principals and teachers were randomly selected. This is shown in Table 1

Table 1: Sample sizes of principals, teachers and students

Sub County	Principals			Teachers			Students		
	N	n	n-s	N	n	n-s	N	n	n-s
Embu East	34	7	1	218	22	3	848	75	11
Embu West	25	5	1	198	20	4	792	70	14
Embu North	23	5	1	172	17	4	838	75	15
Mbeere North	43	9	1	186	19	2	916	82	9
Mbeere South	45	9	1	202	20	2	956	87	9
Total	170		35	976		97	4347		384

Key: **N** = Sub-County population, **n** = sample size, **n-s** = respondents per

As shown in Table 1 the sample size comprised of 35 principals, 97 teachers and 384 students. The sample size of teachers per stratum was a proportion of 10 percent of the teacher population in that stratum while the respondent teachers per school were obtained by dividing the teacher sample size of the stratum by the

number of schools. The method of proportional allocation under which the sizes of the samples from the different strata are kept proportional to the sizes of the strata was used to calculate the sample sizes of students in each stratum. Sample size of students per school was obtained by dividing the stratum sample size by the number of sampled schools in that stratum. The total sample size was 516 individuals.

Instruments and procedure

Questionnaires, interview schedule and an observation checklist were the tools used to garner data. Two questionnaires, one for the teachers and another one for students, were used to obtain data from teachers and students while information from the principals was obtained by use of an interview schedule. The researcher administered the questionnaires to the teachers and with the help of selected teachers administered the ones for the students. After administering the questionnaires the researcher interviewed the principals. The researcher then filled the observation checklist before leaving the school. The need to use different instruments was to allow triangulation of the data from these instruments as a way to eliminate biases from the use of one instrument.

Validity of the instruments

Validity is the degree to which any measurement approach or instrument succeeds in describing or quantifying what it is designed to measure (Weiner, 2007). Meanwhile Zohrab (2013) posit that the concern for validity of research tool is to authenticate the research findings by closely scrutinizing if the research itself examines what it purports to examine. The validity of a research instrument indicates its quality which determines the strength of the conclusion of research (Fraenkel & Wallen, 2003). The validity of instruments was achieved through extensive literature review to get more informed about the relevant items to be included in the instruments. The instruments were then referred to the research supervisors for scrutiny and based on their recommendations the items and the wordings were rectified and improved accordingly.

Reliability of the instruments

Reliability of research instruments refer to the accuracy, sincerity and replicability of the research findings (Nunan, 1999). In essence the research instrument should produce identical results when applied to obtain data from different respondents under same conditions using same methodology. By using data from a pilot study the reliability of the instruments was determined. The sample size for the pilot study comprised of 36 students 10 teachers and four principals all drawn from 4 schools, one school from each sub-County giving a total of 50 individuals which was 10 percent of the actual sample size. Connelly (2008) opines that sample size in piloting should be 10 percent of the actual sample size. This was done by randomly selecting 9 form four students from each of the four schools while teachers were randomly selected in the ratio of 3:3:2:2. The questionnaires were administered to the teachers and students while the researcher interviewed the four principals. The same exercise was repeated after 21 days. Kamta (2016) argue that re-administration of the instrument when determining reliability should be done after 15 but not later than 30 days. Using the two sets of data and with the help of the SPSS software reliability was determined using the Pearson's correlation coefficient product moment by use of Cronbach- alpha statistics. All the instruments had reliability coefficients of more than 0.7 which according to Bhattacharjee (2012) is reliable for collecting data in social science studies.

Data analysis procedure

Analysis involved the computation of frequency distribution of data and their percentages along with searching for the patterns of the relationships that exist among the data groups. The data was first cleaned to detect errors and omissions and correcting where possible. The data from each instrument was then organized according to the objectives of the research. Quantitative data was presented using frequency tables and their percentages. Qualitative data was arranged into common attributes as per each objective of the research. Some information from the interview was presented in raw form. Correlations between the independent and dependent variables were then run with the aid of the SPSS software and presented in form of tables. Computation of chi-square statistics was carried out at $\alpha = 0.05$ to determine if the relationships were significant.

IV. Results

Availability of classes

Availability of classes was assessed through class size. This information was sought from the teachers and the responses are shown in Table 2

Table 2: Class sizes

Class size	Frequency	percentage
Below 40	5	5.4
40-49	31	33.7

Influence of availability of physical facilities on quality of education in public day secondary ..

50-59	46	50
60-69	10	10.9
Total	92	100

From table 2, 60.9 percent of schools had class sizes of 50 students or more. In 10.9 percent of schools classes had as many as 60-69 students. Based on the government recommended class size of 45 students then classes in day public day schools are overcrowded. The results point out that the available classrooms are inadequate.

Class size was then correlated with the dependent variables as shown in Table 3

Table 3: Correlations between class sizes and quality of education

		Academic grade	Completion rate	Enrollment rate	Dropout rate	Repetition rate
Class size	Pearson Correlation Sig. (2-tailed)	-.712	-.702	-.717	.734	.836
	N	92	92	92	92	92

*.Correlation is significant at the 0.001level (2-tailed).

As depicted in Table 3 class size has strong negative correlations with academic grade[r=-.712, p=.631], completion rate[r=-.702, p=.547], and enrollment rate[r=-.717, p=.151].This shows that increase in class size has negative influence on academic grades, completion rate and enrollment rate. Class size correlates positively with dropout rate and repetition rate implying that dropout and repetition rates are likely to increase with increase in class size.

Availability of school laboratories and libraries

The respondents were asked to indicate the number of school libraries and laboratories. The responses are shown in Table 4

Table 4: Number of school laboratories and libraries

No of facilities	Laboratory		Library	
	f	%	f	%
0	0	0	88	95.7
1	84	91.3	4	4.3
2	8	8.7	0	0
Total	92	100	92	100

From Table 4 all schools had at least a laboratory but only 8.7 percent of schools had 2 laboratories. As for the library 95.7 percent of schools had no school library.

The researcher went ahead to establish the adequacy of laboratories. This was ascertained from the data on number of class streams and the number of laboratories. The data is shown in Table 5.

Table 5: Number of laboratories and number of class streams

Number of laboratories	Number of school class streams					
	1		2		3	
	f	%	f	%	f	%
1	27	29.3	57	62	0	0
2	0	0	6	6.5	2	2.2

Table 5 shows that 62 percent of 2 streamed schools were using one laboratory for teaching chemistry, biology and physics. The results suggest that laboratory facilities were inadequate. This was affirmed by the responses from the principals in the interview schedule.

“We created a tenth lesson so as to accommodate a total of 24 double lessons in the laboratory. We know very well this is against the ministerial guideline but what else are we supposed to do?” (Interview session code IS-9)

“We combine the elective subjects such that in form 3 and 4 no students take 3 sciences. Its only chemistry that is compulsory and then a student has to take another one science either physics or biology. That is how we survive.” (Interview session code IS-18)

“We have a small room where we used to keep materials during the construction of that dining hall; we have placed a few benches there and we now use it as physics laboratory.” (Interview session code IS-02)

This is a clear indication that laboratory facilities were inadequate in public day secondary schools in Embu County.

The number of school laboratories was correlated with the dependent variables as shown in Table 6

Table 6: *correlations between number of school laboratories and quality of education*

		Academic grade	Completion rate	Enrollment rate	Dropout rate	Repetition rate
Number of laboratories	Pearson Correlation					
	Sig. (2-tailed)	.704	.884	.904	-.801	-.803
	N	.143	.423	.204	.617	.678
		92	92	92	92	92

*.Correlation is significant at the 0.001level (2-tailed).

As depicted in Table 6 number of laboratories has positive strong correlation with Academic grades, completion and enrollment rate. This suggests that when the number of laboratories increases, the academic grades, completion and enrollment rates improve. Number of laboratories has negative strong correlations with dropout and repetition rates. This suggests that addition of number of laboratories leads to reduction in dropout and repetition rates.

The study further sought to find out the availability of electricity and internet in public day secondary schools. The responses from teachers are shown in Table 7

Table 7: *Availability of electricity and internet in schools*

Facility	Available		Not available	
	Frequency	Percent	Frequency	Percent
Electricity	92	100	0	0
Internet	3	3.3	89	96.7

According to Table 7 all schools are connected to the national power grid but only 3.3 percent of schools had access to internet services. The results suggest that students were deprived of the online digital resources crucial for reducing the gap in the digital divide in the ever growing technologically driven economies. Availability of internet was then correlated with dependent variables as shown in Table 8

Table 8: *Correlation between availability of internet and quality of education*

		Academic grade	Completion rate	Enrollment rate	Dropout rate	Repetition rate
Availability of internet	Pearson Correlation	.				
	Sig. (2-tailed)	.811	.826	.722	-.016	-.004
	N	.936	.803	.841	.294	.914
		92	92	92	92	92

*.Correlation is significant at the 0.001level (2-tailed).

Table 8 shows that availability of internet has positive strong correlations [above 0.7] with academic grades, completion and enrollment rates. These suggest that access to internet leads to improvement in academic grade of students and increase in completion and enrollment rates. Availability of internet was found to have very weak negative correlation with dropout rate[r=-.016, p=.294] and repetition rate r=-.004, p=.914].

The ratio of school toilets to students was also of interest to the researcher. And the responses are presented in Table 9

Table 9: *Ratio of school toilets to students*

Toilet to student ratio	Frequency	percentage
Greater than 1:10	27	29.3
1:10-1:20	14	15.2
1:21-1:30	43	46.7
1:31-1:40	8	8.7
Total	92	100

As depicted in Table 9, 91.3 percent of schools had toilet to student ratio greater than 1:30. This shows that the schools had met the recommended ratio of 1:25 and 1:30 for girls and for boys respectively. The toilet to student ratio was then correlated with the dependent variables and the results are as shown in Table 10

Table 10: Correlation between toilet to student ratio and quality of education

		Academic grade	Completion rate	Enrollment rate	Dropout rate	Repetition rate
Toilet to student ratio	Pearson Correlation	.773	.813	.750	-.825	-.759
	Sig. (2-tailed)	.154	.345	.622	.652	.316
	N	92	92	92	92	92

*.Correlation is significant at the 0.001level (2-tailed).

From table 10 there are strong positive correlations between toilet to student ratio and academic grades, completion and enrollment rates. This suggests that investing in more school toilets leads to improvement of academic grades and increase in both completion and enrollment rates. Toilet to student ratio has strong negative correlation with dropout and repetition rates. This suggests that investing in school toilets leads to decrease in dropout and repetition rates.

The researcher also recorded the state of selected physical facilities in the observation check-list and the data is presented in Table 11

Table 11: State of the physical facilities

Facility	State	Frequency	Percentage
Structure type			
Classrooms	a) Permanent	19	86.4
	b) Semi-permanent	3	13.6
	c) Temporary	0	0
Toilets	a) Flush toilets	2	9.1
	b) Pit latrines	20	90.9
Organization			
School play ground	a) Reflect diverse co-curriculum	4	18.2
	b) Lacks pitches, fields	9	40.9
	c) Grass not maintained	14	63.6
Laboratory	a) Chemicals kept in lockable cabinets	18	81.8
	b) Clean benches	16	72.7
	c) Stools well arranged	9	40.9
	d) Clean sinks	12	54.5
Library	a) Specifically built with purpose	1	25
	b) Classroom/store to function as a library	3	75
	c) Books arranged in shelves	1	25

Table 11 shows that only 13.6 percent of schools had semi-permanent classes, 90.9 percent were using pit latrines, and in a majority of schools (81.8%) play fields didn't reflect diverse co-curriculum. In 81.8 percent of schools laboratory chemicals were well stored in lockable cabinets, 72.7 percent had clean benches, and 54.5 percent had clean sinks. Only in a quarter of schools that had libraries had structure specifically built for the purpose. In other schools a class or a store served as a library.

The chi-square tests were computed to determine if the relationships between the independent and the dependent variables were statistically significant at $\alpha = 0.05$. The computed values are presented in Table 12

Table 12: Chi-square statistics on the relationships between aspects of physical facilities and quality of education

Aspect	Value	df	p-value
Class size * Trends in enrolment	4.301 ^a	8	0.027
Ratio of toilets to students * completion rate	14.046 ^a	6	0.046
Internet in the school * dropout rate	9.714 ^a	2	0.042
Number of laboratories * academic grades	25.461 ^a	12	0.013

As depicted in Table 12, all the variables have p-values less than $\alpha = 0.05$. The number of laboratories in a school has the greatest influence on academic grades with a p-value = 0.013 while the least influence is that of ratio of toilets to students on completion rate with a p-value = 0.048. This indicates that the relationship between

availability of physical facilities and quality of education is statistically significant. The null hypothesis which states that there is no significant relationship between availability of physical facilities and quality of education in Embu County is thus rejected.

V. Conclusion

Based on the findings of the study it was clear that there were inadequate physical facilities in public day secondary schools in Embu County. The study found that classes were overcrowded, only 25 percent of school that had libraries built for the purpose; the rest had either unused classrooms or a store serving as a library. A majority of schools were double streamed and had just one laboratory. All schools were connected to the national power grid but almost all schools (96.7%) had no access to the internet. However school had met the minimum ratio of school toilet to students. The relationships between the availability of physical facilities and quality of education were statistically significant

VI. Recommendations

The study established that physical facilities have statistically significant relationship with quality of education. However public day secondary schools were found to have inadequate physical facilities. The study recommends that the government should improve on the funds meant for maintenance and improvement of school facilities. The study also recommends that the government should prioritize the connection of all schools to the internet to enhance the quality of education.

References

- [1]. Ajayi, O. V., Audu, C. T., & Ajayi, E. E. (2017). Influence of Class Size on Students Classroom Discipline, Engagement and Communication: A Case Study of Senior Secondary Schools in Ekiti State, Nigeria. *Sky Journal of Educational Research*, Vol. 5(5), 60-67.
- [2]. Alam, M. J., & Kaneko, S. (2019). The Effects of Electrification on School Enrolment in Bangladesh: Short-and Longterm Perspectives. *Energies*, Vol. 12, No.4, 1-26.
- [3]. Asian Development Bank. (2020). *Viet Nam: Secondary Education Sector Assessment, Strategy, and Roadmap*. Mandaluyong: Asian Development Bank.
- [4]. Bhattacharjee, A. (2012). *Social Sciences Research: Principles, Methods and Practices*. Florida: University of Florida.
- [5]. Coleman, J. S. (1966). *Equality of educational opportunity*. Washington, DC: US government printing office.
- [6]. Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative and mixed methods Approaches (2nd. ed)*. London, UK: SAGE Publications.
- [7]. Fraenkel, J. R., & Wallen, N. E. (2003). *How to Design and Evaluate Research in Education. (Fifth ed.)*. New York: Mc Graw-Hill.
- [8]. Hamza, A. (2016). *The Impact of Building Toilets on School Enrollment: Down the Drain*. Washington, D.C: Georgetown University .
- [9]. Hodson, E. (1990). A Critical Look at Practical Work in School Science. *School Science Review*, VOL.70, issue 256, 33-40.
- [10]. Information Guide Africa. (2018, August 8). *Solutions to Challenges Facing Education in Kenya*. Retrieved from <https://www.infoguideafrica.com/2018/08/Solutions-Challenges-Facing-Education-Kenya.html>
- [11]. Jackoski, M. (2013, August 12). *Education Needs Electricity*. Retrieved from <https://www.borgenmagazine.com/education-needs-electricity/>
- [12]. Kamta, P. (2016). *RE: How many days between assessments for measuring a test-retest reliability?* Retrieved from https://www.researchgate.net/post/How_many_days_between_assessments_is_best_for_measuring_a_test-retest_reliability/57e60b26615e2725086a9484/citation/download.
- [13]. Kothari, C. R. (2004). *Research Methodology. Methods & Techniques (2nd ed.)*. New Delhi: New Age International Publishers Ltd.
- [14]. Leo, I. (2016). *Influence of Library Services on Students Academic Performance in an Ordinary Certificate of Secondary Education in Mtwara- Mikindani Municipality, Tanzania*. Dar es Salaam: Open University of Tanzania.
- [15]. Marzoli, R., & Papa, O. (2017). *School Library and Students Achievement: The Relationship in Schools from Diverse Socio-economic and Cultural Backgrounds*. Roma: National institute for the Educational Evaluation of Institution and Training.
- [16]. Memillan, J. H., & Schumacher, S. (2001). *Research in Education: A Conceptual Introduction, 5th Edition*. New York: Longman.
- [17]. Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass.
- [18]. Nunan, D. (1999). *Research Methods in Language Learning. Eighth Printing*. Cambridge: CUP.
- [19]. Nwaogu, E. J. (2019). *The World Educational Crisis*. London: Oxford University Press.
- [20]. OECD. (2007). *Education at a Glance*. Paris: OECD.
- [21]. Percel, T., & Menaghan, E. (1994). Early parental work, family social capital, and early childhood outcomes. *American Journal of sociology*, Vol. 4, 972-1009.
- [22]. Ramli, A., & Zain, R. M. (2018). The Impact of Facilities of Students' Academic Achievement. *Science International (Lahore)*, Vol. 30, No.2, 299-311.
- [23]. SCCYP. (2013). *Toilets Unblocked: A Literature Review of School Toilets*. Edinburgh: SCCYP.
- [24]. Sekaran, U., & Bougie, R. (2010). *Research methods for business: A skill building approach (5th ed.)*. West Sussex: John Wiley & sons Ltd.
- [25]. Shana, Z., & Libdeh, E. S. (2020). Science Practical Work and its Impact on High Students' Academic Achievement. *Journal of Technology and Science Education*, Vol. 10, No.2, 199-215.
- [26]. Singolyo, M. P., & Ngussa, B. M. (2019). Female Students' Perceived Self-Esteem Based on Availability of Sanitary Facilities Among Public Secondary Schools in Monduli District, Tanzania. *Integrity Journal of Education and Training*, Vol. 3 (4), 83-94.
- [27]. UNESCO. (2005). *EFA Global Monitoring Report: Education for All. The Quality Imperative*. Paris: UNESCO.
- [28]. Weiner, J. (2007). *Measurement: Reliability and Validity measures*. Baltimore: Johns Hopkins University.

- [29]. World Bank . (2008). *The Road Not Travelled Education Reform in the Middle East and North Africa*. Washington, DC: World Bank.
- [30]. World Bank. (2001). *Engendering Development Through Gender Equality in Rights, Resources, and Voice*. Washington DC: Oxford University Press.

Simon Muchira Mbogo, et. al. "Influence of availability of physical facilities on quality of education in public day secondary schools in Embu County, Kenya." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 12(03), (2022): pp. 01-10.