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Influence of Strategic Infrastructural Development Facilities on Academic Performance in Public Secondary Schools in Kisii County, Kenya

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ABSTRACT: Strategic infrastructural development facilities in schools can make a difference in students' academic performance. The low academic performance in Kisii County has raised eyebrows from all stakeholders in the sector of education. This study aimed to establish the influence of strategic infrastructural development facilities on students' academic performance in public secondary schools in Kisii County, Kenya. The study employed a descriptive survey design. The study considered a population target of 353 principals and 4354 teachers from 353 public secondary schools in Kisii County. The researcher used Slovin's coefficients to sample 28 (28 school) principals and 341 teachers. The researcher used observation schedules, questionnaires, and interview schedules for principals to collect data. The study used questionnaires to confirm reliability since Cronbach's Coefficient Alpha 0 .998 was higher than the critical Cronbach alpha of 0.7 on a scale of -1 to +1. Data were analyzed both quantitatively and qualitatively. The researcher presented data using frequency distribution tables, means, and percentages for a more straightforward interpretation. Analysis of Variance (ANOVA) analyzed quantitative data from Likert scales; Regression analysis showed the influence of the independent variable (infrastructural development facilities) on the dependent variable(academic performance). Education Production Function theory; relates inputs in education to output was applied. This study's findings showed that strategic infrastructural facilities influence academic performance greatly in Extra County and national schools than in county and sub-county secondary schools. The results will benefit educational researchers and the Ministry of Education by using strategic infrastructural development facilities to make education policies for schools. In conclusion, National and Extra-county secondary schools have adequate infrastructural facilities resulting in outstanding academic performance compared to county and sub-county secondary schools; school academic performance varies depending on the category of the school.

Keywords: Strategic infrastructural development facilities, Academic Performance, Public Secondary Schools, Kisii County, Kenya.

1.0 Introduction

Buildings, laboratories, classrooms, dining hall, and equipment- are education infrastructure. They are vital learning elements in the school environment. As opined by Davis (2021), poor school infrastructure contributes negatively to academic performance. In contrast, solid evidence has shown that high-quality infrastructure facilitates instructions, improves learners' academic performance, and reduces the rate of dropouts, among other many benefits. In the U.K., research has shown that the physical environment can impact a student's academic progress by 25%. Alternatively, crowded classrooms result in lower student achievement with a poorer disposition.

Even if educational policymakers focus on the quality of education and the school learning environments, many countries adopted a fragmented or piecemeal approach to investing in their educational infrastructure. For instance, in Romania, decisions about education infrastructure investments were made under an uncoordinated and decentralized model driven by ad hoc needs and limited funding availability rather than a strategic approach; Davis (2021).

Davis (2021) insists that in Romania, schools in marginalized areas experience more significant investment needs, which shows that those students who attend these schools are seriously disadvantaged. Most of these students are from rural families with low incomes. It has made these students participate in underequipped schools. For instance, 72 percent of schools in rural areas lack a science laboratory; almost 40 percent do not have adequate indoor toilets. Conversely, urban schools are well equipped, although many are overcrowded. The researcher pointed out that one among four students in urban areas attends a crowded school, and most schools operate in shifts.

Further analysis revealed more challenges depending on geographic area and education level. For example, Romanian localities which had enrolled students in overcrowded schools had higher-grade repetition, dropout rates, and age-grade distortion. It suggested that inadequate infrastructure and poor learning environments affected students negatively in academic progress; Teixeira, Amoroso, and Gresham (2017).

According to Nuggroho and Wiboro (2019), in Asia, educational facilities and infrastructure support the learning process to run optimally, especially in achieving learning objectives. If the infrastructure provided is inadequate, students will become less enthusiastic and less interested. It can affect the activity of students in following the learning process. The development of school infrastructure improves learning outcomes, and their utilization increases the intensity of student learning activeness, including physical and psychological involvement. Infrastructure in the 21st century must prioritize matters aimed at improving infrastructure factors related to learning, building libraries, science laboratories, computer laboratories, or public use spaces. This reviewed study looked at only infrastructure in Asia but not Kisii County, Kenya.

Literature Review

Many types of research show how infrastructural development initiatives influence students' academic performance. Queiroz, Sampaio, & Sampaio's (2020) research, as supported by Akoto-Baako, H. (2018), reported that smaller classes and comfortable classroom temperature contribute to good opportunities for students to participate fully in discussions, thus reducing indiscipline cases and thereby enhancing better performance. It is opposite to schools which have sub-standard buildings. Although this initiative is similar to the done study, the researcher aimed to find out the influence of such facilities (classroom size and adequacy), among other facilities, on students' academic performance in Kisii County - Kenya.

Other infrastructural initiatives, as illustrated by (Adukia, 2013) in India, confirmed that the construction of latrines in schools jointly with hygiene education programs showed a positive relationship with good academic performance. Other programs of providing water buckets termed as small-scale investments were not exceptional. Such positive outcomes triggered the researcher to establish the influence of infrastructural development facilities on academic performance in Kisii County public secondary schools.

In Nigeria, Adepoju (2001) and Kolawole (2000) studied school infrastructure planning about students' performance in academics in different areas in secondary schools. They found that comparing schools with or without good organization and maintenance, schools with good organization and better infrastructure maintenance register higher students' academic achievements. Similary, Taylor and Vlastor(2009) found that schools' academic performance is encouraged and strengthened by adequate physical infrastructure. Schools will realize good performance if learners have a conducive learning environment. It will also motivate teachers

to deliver well in the classrooms, thus adding value to the learners and improving academics. Do Kisii County public secondary schools have adequate infrastructure as portrayed in Nigeria, and what is the influence of these infrastructural development initiatives on students' academic performance?

In Rwanda, Uwimana and Andala (2020) studied the relationship between school infrastructure and students' academic performance in Twelve Years Basic Education (12YBE). The perceptions from the respondents of the study indicated that; an average of 70.5 % disagreed with the adequate school infrastructures available in Twelve Years Basic Education (12YBE) in the Gasabo district. The inadequate school infrastructure indicated in twelve years of primary education reduces students' academic performance. The qualitative findings revealed that school infrastructures in 12YBE completed classrooms, well-equipped libraries and laboratories, good playgrounds, and school sanitation. The study looked into infrastructure as an independent variable, employed a correlation research design, and used a sample size of 200 people (school head teachers, deans of studies, teachers, students, and parents). In contrast, the current study used a sample size of 28 principals and 341 secondary school teachers and a descriptive research design.

There is a positive correlation between institutional resources and the academic achievement of students Perry, Lundie, & Golder. (2019). Schools that are less endowed with resources perform poorly than those that are gifted. It is similar to Turkana County, where an eleven-year-old Lesokona followed a mathematics lesson with a smile. She and her classmate Atiir exchanged gleeful glances in their new newly constructed classroom at Kawarnaparan primary school in Kenya. She thanked World Vision for making their classroom. And that learning was fun since they now had good desks, unlike before, and the class was also spacious. She confirmed that knowledge in the afternoon had been unbearable because of the heat. However, now they could study comfortably because the ceiling board made it cool (Muluka, 2021).

A positive education outcome of this project is improvement in enrolment, attendance, and retention of children in schools. These enabled students to focus on education; Muluka (2021). Quality Infrastructure dramatically influences the academic standards, which gives rise to a School Education Quality Index.

Okong'o (2017) cited that

Kisii County performed poorly in the 2016 KCSE examinations due to a lack of infrastructural facilities in the secondary schools. Further, Obegi (2016) points out that Kisii

County has challenges affecting education; these challenges include; a lack of facilities such as electricity, laboratory, and classrooms in some of the institutions.

Statement of the Problem

Kisii County has experienced poor academic performance for several years. The average means standard score for 2016 to 2020 was 3.775 less than the average national means standard score of 3.906. Most students did not do well and were locked out of University since the cut-off is a C+ (seven points out of twelve).

Research methodology

The study adopted a descriptive survey design. It used a descriptive survey design because it describes the context and builds a picture of the current situation. According to (Best & Khan, 2006), this method gives information or phenomena and helps get valid general conclusions from the facts discussed. A descriptive survey explains, analyzes, and interprets the influence of strategic infrastructural development facilities on student academic performance in public secondary schools in Kisii County. Four thousand seven hundred seven teachers, 353 principals, and 4354 other teachers formed the target population.

Research Findings and Discussions

The research question was: How do strategic infrastructural development facilities influence the academic performance of public secondary schools of Kisii County, Kenya? The study sought to establish strategic infrastructural initiatives to enhance public secondary schools' academic performance.

Table 1

Teachers' Responses on Infrastructural Development Strategic Initiatives

S/No.	Common Theme	Frequency	%
1.	Schools using tents as classrooms	40	13
2.	Students serving meals in shifts	30	9.8
3.	School borrowing chairs	21	6.8
4.	Schools using stores as offices	10	3.3

5.	Students doing science practicals/exams in shifts	86	28
6.	Teachers sharing offices/playground	70	22.8
7.	Students using hall/classes as dormitories	50	16.3
	Total	**307**	**100**

The result in Table 1 above indicates infrastructural initiatives teachers use in public secondary schools in Kisii County. They help them solve the problem of infrastructural development facilities shortages in their schools. About 40 (13%) of the teachers indicated that students use tents as classrooms to create more room for studies. The students to save time for studies to improve in academics, they need to manage their time well; 30 (9.8%) of the teachers indicated that students serve meals in shifts, and 21(6.8%) of the teachers noted that the school borrows chairs for use from neighbors/other schools. It helps the school users to be comfortable during school events/activities, bettering student academic performance. The study found that 10 (3.3%) of the teachers used offices, 86 (28%) of the teachers who were the majority indicated that students do examinations in shifts, and 70(22.8%) of teachers revealed that teachers share offices/playground with others. The students need to be physically fit, making them ready to study to improve in academics, and 50 (16.3%) of the teachers indicated that students use classes or halls as dormitories to create enough space for sleeping.

The study recorded survey infrastructural facilities results of the public secondary schools in Kisii County and their influence.

Table 2

Means and Standard Deviations of Strategic Infrastructural Facilities on Academic Performance

	Sub-County		**County**		**Extra-County**		**National**	
Statement	**Mean**	**Std**	**Mean**	**Std**	**Mean**	**Std**	**Mean**	**Std**
Laboratory	2.00	.771	3.65	.479	4.52	.504	5.00	.00
Toilets/bathrooms	2.13	.768	4.04	.249	5.00	.00	5.00	.00
Classrooms	1.54	.620	3.04	.202	4.57	.499	5.00	.00

Library	2.00	.771	3.65	.479	4.52	.504	5.00	.00
Dormitories	1.54	.620	3.04	.202	4.57	.499	5.00	.00
Lockers/chairs	2.01	.818	4.04	.323	5.00	.00	5.00	.00
Playground	1.84	.762	3.69	.463	4.84	.373	5.00	.00
Dining hall	2.00	.771	3.65	.479	4.52	.504	5.00	.00
Offices	2.00	.771	3.65	.479	4.52	.504	5.00	.00

Table 2 show laboratory, toilets/bathrooms, classrooms, library, dormitories, lockers/chairs, playground, dining hall and offices infrastructural facilities being at very adequate level in the influence of academic performance at extra-county schools. Their means and standard deviations are (Mn = 4.52, 5.00, 4.57, 4.52, 4.57, 5.00, 4.84, 4.52, 4.52; STD = .504, .000, 4.99, .504, .499, .000, .373, .504, .504) respectively; and at national schools (Mn = 5.00; STD = .000). At the county schools, classrooms and dormitories infrastructural facilities are at somehow adequate level in the influence of academic performance (Mn = 3.04; STD =.202) while laboratory, toilets/bathrooms, library, lockers/chairs, playground, dining hall, offices, and infrastructural facilities are at adequate level on the influence of academic performance (Mn = 3.65, 4.04, 3.65, 4.04, 3.69, 3.65, 365; STD = .479, .249, .479, .323, .463, .479, .479) respectively. On the other hand, at the sub-county level laboratory, toilets/bathrooms, classrooms, library, dormitories, lockers/chairs, playground, dining hall and offices infrastructural facilities at inadequate level on the influence of academic performance (Mn = 2.00, 2.13, 1.54, 2.00, 1.54, 2.01, 1.84, 2.00, 2.00; STD = .771, .768, .620, .771, .620, .818,.762, .771, .771) respectively.

The researcher further did component factor analysis to establish whether all the infrastructural facilities contributed to academic performance; table 3indicate the findings.

Table 3

Principal Component Analysis

Variable	**Component**
E1 Laboratory	.987
E2 Toilets/bathrooms	.972
E3Classrooms	.963
E4 Library	.987

E5 Dormitories	.963
E6 Lockers/chairs	.976
E7 Playground	.978
E8 Dining hall	.987
E9 Offices	.987

Table 3 shows laboratory, toilets/bathrooms, classrooms, library, dormitories, lockers/chairs, playground, dining hall and offices infrastructural facilities have correlation coefficient (.987, .972, .963, .987, .963, .976,.978, .987, .987) respectively. The nine variables have a correlation coefficient of more than the recommended minimum .7.

The study tested the hypothesis using infrastructural facilities variance. H_{01}: Strategic infrastructural development facilities do not influence academic performance in Kisii county secondary schools. The research findings are as indicated in Table 4.

Table 4

Analysis of Variance of Infrastructural Facilities

ANOVA

	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Between Groups	25538.801	3	8512.934	442.050	.000
Within Groups	5815.868	302	19.258		
Total	**31354.669**	**305**			

Table 4 gives an Analysis of Infrastructural facilities' Variance (ANOVA). The strategic infrastructural development facilities have a statistically significant influence on academic performance in secondary public schools in the county of Kisii, Kenya ($p = .000 < p = .05$). The null hypothesis rejected, H_{01}: Strategic infrastructural development facilities do not influence academic performance in public secondary schools in the county of Kisii, Kenya, tested at $p<.05$ significance level. The calculated $F(3, 306) = 442.050$ is more than the critical value ($F = 2.997$), thus, indicating differences in the influence of strategic Infrastructural facilities on all categories of public secondary schools in Kisii County.

The study used an observation schedule to show the influence of infrastructural development facilities on academic performance. The key used was: 1-Not at all, 2-Less extent, 3-Moderate extent, 4-Large extent, and 5-Very large extent. Table 5 below illustrates the results:

Table 5

Observation Schedule

Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
O1 Laboratory	43	1	5	2.21	1.319
O2 Toilets/bathrooms	43	1	5	3.91	.947
O3 Classrooms	43	1	4	2.42	1.118
O4 Library	43	1	5	3.07	1.183
O5 Dormitories	43	1	5	3.23	1.088
O6 Lockers/chairs	43	1	5	3.30	1.423
O7 Playground	43	1	5	2.00	1.345
O8 Dining hall	43	1	5	4.00	1.000
O9 Offices	43	1	5	2.84	1.430

Table 5 shows that toilets/bathrooms and dining halls influence academic performance to a large extent. Their means and standard deviations are (Mn = 3.91, 4.00; STD = .947, 1.000) respectively. The library, dormitories, lockers/chairs, and offices moderately influence academic performance. Their means and standard deviations are (Mn = 3.07, 3.23, 3.30, 2.84; STD = 1.183, 1.088, 1.423, 1.430) respectively. The laboratory, classroom, and playground infrastructural facilities have less influence on academic performance. Their means and standard deviations are (Mn = 2.21, 2.42, 2.00; STD = 1.319, 1.118, 1.345) respectively.

The researcher observed that the toilets/bathrooms and dining hall influence academic performance to a large extent. However, laboratory, classroom, and playground infrastructural facilities had a lesser influence on academic performance. At the same time, libraries, dormitories, lockers/chairs, and offices, to a moderate extent, influence academic performance.

Generally, it shows that infrastructure has a positive influence on academic performance.

The principals of public secondary schools responded to open questionnaires on how their Infrastructural development initiatives ensure efficient school management. The researcher administered 28 questionnaires to 28 principals and analyzed and reported the common themes in Table 6.

Table 6

Principals' Responses on Infrastructural Development Strategic Initiatives

S/No.	Common Theme	Frequency	Percentage
1	Construction of more classes	27	**96.4**
2	Temporal tents as classrooms	11	**39.3**
3	Library as office	26	**92.9**
4	Conversion of the dining hall to class/dormitory	7	**25.0**
5	Staffroom as a store	28	**100**
6	Writing a proposal for the construction of a laboratory	20	**71.4**

Table 6 shows the principals' responses to infrastructural initiatives incorporated in the school strategic plan. About 27 (96.4%) indicated the construction of more classes,11 (39.3%) suggested temporal tents as classrooms,26 (92.9%) indicated the library as an office, and 7 (25.0%) indicated the conversion of the dining hall to class/dormitory, all principals 28 (100%) stated staffroom as a store, and 20 (71.4%) indicated writing a proposal for the construction of the laboratory. Whereas most principals noted the structure of more classes, using the library as an office, and writing proposals for the construction of a laboratory, less than half indicated temporal tents as classrooms and showed conversion of the dining hall to class/dormitory as infrastructural initiatives.

The principals had to explain how the infrastructural development facilities have influenced academic performance. A principal from a national school said that the construction of more laboratories, classrooms, and library provides enough space conducive to learning. Also, the principal said infrastructural development initiatives incorporated into the school's strategic plan to cater to emerging trends in the future.

A principal from a county school said;

Good infrastructure help improve academic performance because it makes the students comfortable during the learning process.

Further, a principal from a Sub-County school in Kisii County quoted that; internal examinations can be administered under the shade when the weather is conducive to reducing congestion in the few available classrooms.

A principal from one of the different county schools reported that serving meals (breakfast, lunch, and supper) in shifts increases study hours for students to improve their academic performance.

The current study revealed that schools with good infrastructural

facilities perform better academically with resources. It concurs with other researchers that a school with more resources registers better academic performance than the less endowed schools. Berg & Cornell (2016) and Perry, Lundie, and Golder (2019) supported that the adequacy of school infrastructure positively correlates with increased academic performance.

The statement above concurs with (Adukia, 2013) in India, who confirmed that the initiative of constructing latrines in schools that were implemented jointly with hygiene education programs showed a positive relationship with good academic performance. Other programs of providing water buckets termed as small-scale investments were not exceptional. The current study revealed that: classrooms, dormitories, lockers/chairs, library, laboratory, laboratory, dining hall, offices, toilets/bathrooms, and playground infrastructural facilities were adequate to influence academic performance at extra-county and national secondary schools in Kisii County. It concurs with Queiroz, Sampaio, & Sampaio (2020), who researched California and reported that classes and comfortable classroom temperature contribute to good opportunities for students to participate fully in discussions, thus reducing indiscipline cases and thereby enhancing better performance.

Adukia's positive outcomes triggered the researcher to assess the influence of infrastructural development facilities on academic performance in Kisii County Public Secondary Schools. At county schools, the researcher found the dormitories and classroom infrastructural initiatives somehow adequate to influence academic performance. In Nigeria, Adepoju (2001) and Kolawole (2000) studied school infrastructure planning about the concert in academics of students in secondary schools in different areas. He found out that a school with good organization and maintenance has higher students' academic achievements compared to one

without. Taylor and Vlastor (2009) found that a school's academic performance is encouraged and strengthened by adequate physical infrastructure.

The current study also revealed that laboratory, lockers/chairs, library, offices, dining hall, toilets/bathrooms, and playground infrastructural initiatives were sufficient to influence county secondary schools' academic performance. It concurs with Nuggroho and Wiboro (2019) in Asia, who says good infrastructural development leads to good learning outcomes. These structures include roads, sewers, water supply, electrical grids, renewable energy telecommunications, etc. For students' efficient and effective academic performance in a school learning environment to be realized, there should be the proper provision of quality infrastructure. The facilities which will earn this good name include having adequate water and power supply, improved communication, and transportation systems, sufficient classrooms, laboratories, libraries, dormitories, furniture items, halls, sanitation facilities, open fields, and sports equipment.

However, the current study also confirmed that classrooms, dormitories, lockers/chairs, dining hall, toilets/bathrooms, playground, offices, library, and laboratory infrastructural facilities were inadequate to influence academic performance at sub-county secondary schools. Since they are insufficient, good results cannot be realized at sub-county schools hence the findings concur with Perry, Lundie, and Golder (2019), who say there is a positive correlation between institutional resources and the academic achievement of students. Those schools that are less endowed with resources perform poorly compared to those that are gifted with resources. This agrees with Teixeira, Amoroso, and Gresham (2017), who say that inadequate infrastructure and poor learning environments negatively affect students' academic progress. This is supported by Uwimana and Andala’s (2020) study in Rwanda, which found that the inadequate school infrastructures indicated in the 12YBE reduce students’ academic performance.

The suggestions by Obegi (2016) and Okongo (2017) that performance in academics is affected by the inadequacy of infrastructure in Kisii County concurs with the current study of the sub-county schools. Infrastructural facilities are inadequate hence low academic performance.

Conclusion

The researcher found classrooms, dormitories, lockers/chairs, dining hall, laboratory, library, toilets/bathrooms, playground, and offices very adequate and had a significant influence on academic performance at extra-county and national schools in Kisii County.

Recommendation

The research recommended that secondary schools in Kisii Sub-County should develop infrastructural development initiatives to solve the inadequacy of the facilities in the schools.

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