

## Physical Facility Availability and Students' Academic Performance in Public Secondary Schools in Trans Nzoia East Sub-County, Kenya

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### ABSTRACT

*Education is essential for individual growth and national progress, but its success largely depends on the institutions that sustain it. Identifying how these institutional factors contribute to or hinder academic success is vital for overcoming challenges in the education sector and promoting academic achievement. This study seeks to examine how physical facility availability influences academic performance of learners in public secondary schools in Trans Nzoia East Sub-county, Kenya. The study set out to ascertain the following effects: the influence of science laboratories and computer laboratories in the academic performance of students in public secondary schools in Kenya's Trans Nzoia East Sub-County; assess the influence of library resources on the academic performance of students in public secondary schools in Kenya's Trans Nzoia East Sub-County; to evaluate the effects of dormitories on the academic performance of students in public secondary schools in Kenya's Trans Nzoia East Sub-County; and the impact of sanitation facilities and open fields on the academic performance of students in public secondary schools in Kenya's Trans Nzoia East Sub-County. Based on the principle of the Education Production Function, the study was conducted utilizing a mixed-methods, descriptive approach. The research targeted a population of 4574 persons consisting of 73 principals, 1,280 serving instructors and 3221 senior students in government secondary institutions. Participants were selected using random sampling to appoint the sample of principals, teachers and students. A sample of 354 individuals were identified using the Krejcie & Morgan table (1970) of choosing the appropriate number of sample. The sample consisted of 6 principals, 99 serving teachers and 249 form four students. To collect data, the study used interviews, questionnaires, document analysis and observation. The instruments were piloted in three public secondary schools in Trans Nzoia West region. Validity testing was done by the researcher being assisted by professionals who expertise in various aspects of validity. In reliability, test-retest method was administered and determined by the Cronbach alpha coefficient of a 0.7 threshold. . The analysis of quantitative data employed descriptive and inferential statistical techniques, with the aid of SPSS version 26 while qualitative data were categorized into themes corresponding to the study's key objectives. The key findings indicated a statistically significant association between physical facilities and the academic performance of students. A Pearson correlation analysis demonstrated a significant positive relationship (0.968) between the availability of physical facilities and students' academic performance indicating that students in schools with better facilities achieved higher scores academically. These results confirm that the presence of adequate physical facilities support better learning condition and hence improve students outcomes. It is recommended that educational policymakers invest in enhancing physical facilities to improve academic outcomes for students in public secondary schools.*

**Key words:** Academic Performance, Computer and Science Laboratories, Library Resources, Dormitories, Sanitation Facilities, Open Fields

### I. INTRODUCTION

Education plays a pivotal role in society by equipping students with knowledge, skills, and ethical values necessary for both personal development and professional success. For education to be truly impactful, it must occur within an environment that fosters learning. The institutional framework of a school is closely tied to this environment, as it influences the policies, procedures, and resources that directly affect students' educational experiences and outcomes. Osowe (2022) stated that for teaching and learning to be impelling the institutions building and its environ should be free from any danger and aggression. This is backed up by Bala (2022) who specified that a learning environment that is welcoming and enjoyable performs remarkably as compared to a less conducive environment.

In addition to this, a key factor in raising students' academic achievement is physical facility availability. Globally, studies have indicated that the presence and conditions of physical facilities affects the school's academic performance. Study done by Neilson and Zimmerman (2014) at Princeton University and the University of Chicago regarding the impact of building new schools in Newhaven, Connecticut showed that there was significant increase in reading scores after relocating to a reconstructed or renovated school. The availability, adequacy and maintenance of physical facilities have an impact in process of learning and instruction which may negatively impact students' academic achievement.

In Sub-Saharan Africa, there are shared trends and difficulties that relate to physical facility availability. According to the Sub-Saharan Africa regional study, there are worries regarding human resource availability, physical resource availability, and the quality of physical facilities. This has been primarily brought about by underfunding in the education sector. According to research done by Baafi (2020) in Ghana, Students at senior high schools with good physical environments outperform those in less favorable learning environments. Sufficient educational facilities create an atmosphere that is favorable for learning. Respondent data was collected using a quantitative methodology in this study.

On a national perspective, the high population of students in public secondary schools in Kenya has been influenced by 100% transition rate policy from primary institutions to secondary institutions. Public secondary schools have suffered a major setback due to insufficient resources both human and physical in demand by the overwhelming number of students. According to a study carried out by (Murungi and Muthee 2017), the availability of resources was one of the factors that affected the KCSE performance in Kenya. They also stated that the physical design or arrangement of a classroom that supports the social and emotional requirements of the students is what makes it effective. This is backed up by research done by Luketero and Kangangi (2019) on the factors that influence students' academic performance in Kirinyaga Central region. With a representative sample of 163 participants and a descriptive survey technique, it was shown that 94.1% of the people surveyed concurred that pupils' performance is influenced by school resources. A study conducted by Akungu (2014) titled the impact of instructional resources on academic success in Embakasi District, discovered that apart from physical facilities and severe human resource shortages, which result in overstretched resources with yearly increases in enrolment rates, educational resources, particularly those used in learning in the classroom, such as chalk and charts, are accessible and in use in schools. This compromises the quality of education.

Trans Nzoia East Sub-county has experienced a substantial population surge in public secondary schools, mirroring the national trend. Although the pace of primary school migrations is ecstatic, this issue has also caused physical and human resources in rural places, such as Trans Nzoia East Sub-County, to become strained. Various factors affect physical facility availability in Trans Nzoia East Sub-county. Due to tight budgets, most schools may experience a shortage of physical facilities. The educational institutions in Trans Nzoia East Sub County have complex institutional dynamics that call for a multifaceted strategy that includes enhancing physical facilities.

### 1.1 Statement of the Problem

This research aims to explore how physical facility availability may affect students' academic performance. Several studies such as (Ojuok et al. 2020), have investigated the role of physical facilities in academic performance predominantly centering principals as their primary focus, my study will broaden this focus to include insights from principals, teachers and students to ensure a more comprehensive view of the different roles stakeholders. The education setting has a big influence in shaping students' academic experiences; and hence the quality of physical facilities in the school influences their overall performance. Following Kenya's 100% transition rate to secondary schools, the educational environment has insufficient resources, which affects students' academic achievement. It should be noted that in the last five years there has been a below par performance in the Kenya Certificate of Secondary Education (KCSE) in Trans Nzoia East Sub-County as table 1 illustrates.

**Table 1**

*KCSE Means Score in Trans Nzoia East Sub-county*

Year	2019	2020	2021	2022	2023
KCSE mean score	4.21	4.37	4.14	4.32	4.41

Source (Ministry of education Trans Nzoia East office 2024)

This implies that physical facility availability might act as a hindrance to students' academic performance. If the institutional dynamics are not taken into account, schools may struggle to improve academically due to the difficulties in addressing underlying issues affecting academic performance. In light of this, the study's objective was to ascertain how physical facility availability influences students' academic performance in public secondary schools in Trans Nzoia East Sub-County, Kenya.

### 1.2 Research Objectives

The specific objectives were:

- i. To investigate the influence of science laboratories and computer laboratories in the academic performance of students in public secondary schools in Trans Nzoia East Sub-County, Kenya
- ii. To investigate the influence of library resources on the academic performance of students in public secondary schools in Trans Nzoia East Sub-County, Kenya

- iii. To investigate the effects of dormitories on the academic performance of students in public secondary schools in Trans Nzoia East Sub-County, Kenya
- iv. To investigate the impact of sanitation facilities and open fields on the academic performance of students in public secondary schools in Trans Nzoia East Sub-County, Kenya

### 1.3 Research Hypothesis

*H<sub>0</sub>*: There is no statistically significant relationship between physical facility availability and students' academic performance in public secondary schools in Trans Nzoia East Sub-county, Kenya.

## II. LITERATURE REVIEW

### 2.1 Theoretical Review

#### 2.1.1 Education Production Function Theory

The study was guided by the education production function theory which was developed by Bowles (1970). It emanated from the field of economics and it stated that outcomes are the result of inputs. In the education context, the study was used to show the connection between school inputs (physical facility availability) and school outputs (student academic performance) in the education process. In this context, the EPF inputs into the education production system are physical facility availability. Physical facility availability refers to the quality and adequacy of infrastructures such as classrooms, laboratories, and libraries. According to EPF physical facility availability has an impact on students' academic performance. The KCSE performance serves as the outcome, or gauge, of the school's performance.

### 2.2 Empirical Review

The quality of physical facilities plays a crucial role in determining the overall success of the educational process. As highlighted by Mohammad *Et al.* (2020), a deficiency in such resources may lead to the production of inadequately prepared graduates, which can adversely affect the nation's economy, social fabric, and ethical standards. Hutton (2014), the general manager overseeing Texas schools, further emphasizes that when schools are equipped with high-performing resources, students are more likely to remain engaged in their studies and persist in attending classes, regardless of the district's broader performance. This link between student attendance and improved academic outcomes underscores the importance of well-maintained learning environments.

#### 2.2.1 Influence of Science Laboratories and Computer Laboratories on Student's Academic Performance

The quality of physical facilities within educational institutions profoundly impacts students' academic success, as supported by recent research that investigates various facility-related elements contributing to academic performance, for instance an investigation into facility-related elements in California, found that students' academic achievement is impacted by physical facilities such as crowded dorms, subpar classroom facilities, poor internet access, a lack of library resources, and large class sizes (Tiruneh *et al.* 2020). Strengthening the academic achievements of students within the educational system is largely dependent on the physical amenities of the schools. According to McGowen's 2007 observation, school facilities are the most important factors that need to be built and considered in order for the system's goals to be met, and the accessibility of these facilities affects both teacher and student quality. An adequate supply of physical assets is crucial for attaining efficacy in the supervision and delivery of teaching in the educational system, according to Ajayi and Ayodele (2001). They underlined that secondary schools' dearth of facilities classrooms, offices, workshops, sports facilities, labs, libraries, and so forth is an excellent illustration of what goes on in the university system.

Laboratories are widely recognized for their important role in enhancing students' performance. The practical application of theoretical knowledge greatly strengthens comprehension and enhances critical thinking. Research suggests that while virtual laboratories can be valuable for convenience, they often fail to match the level of engagement provided in real labs. Students perceive virtual labs as less interactive and exciting which can affect the overall learning experience, consequently academic outcome (Dyrberg *et al.* 2017a). Additional study on the impact of physical amenities on undergraduate scholarly achievements at the University of Calabar, Nigeria showed that the academic success of undergraduate environmental education students is significantly impacted through the availability of physical amenities. This is due to the fact that effective and efficient education will exist wherever the necessary physical facilities are accessible (Agbor *et al.* 2022).

#### 2.2.2 Influence of Libraries on Student's Academic Performance

The role of library resources in enhancing academic achievement is widely acknowledged in educational research, with regular access to these resources often linked to improved learning outcomes. Libraries serve as essential hubs for information and support, offering students the materials and environment necessary for academic growth and

success. Veena and Kotari (2016) conducted a survey examining library usage patterns and user satisfaction. Their findings indicated that 59% made daily visits to the library, they expressed satisfaction with the range of general books and were pleased with the textbook collection. The students were highly with the efficiency of the library's circulation services, suggesting that the frequency of the library visits and access to adequate resources play a major role in academic performance.

In another 2016 study, Thorpe et al. examined the connection between library services and student outcomes, finding a significant association between library usage and increased GPAs and retention rates. Despite these findings, the authors noted that questions remain regarding the motivations behind students' use of library resources and how external factors influence academic success. This emphasizes the importance of qualitative research to gain a nuanced understanding of these connections.

### **2.2.3 Influence of Dormitories on Student's Academic Performance**

The academic performance of students is deeply influenced by their living conditions, especially for those residing in institutional accommodations. Several studies have shown that the presence of adequate facilities in student hostels, such as comfortable rooms, significantly contributes to enhancing students' academic success. A study was conducted on exploring the impact of hostel life of students on academic performance and it revealed that, adequate facilities in students hostels, including room comfort play a crucial role in enhancing academic performance. Conversely, limitation in this service can lead to student dissatisfaction and may hinder academic success Mushtaq and Khan (2012). An investigation on the impact of school infrastructure on pupils' learning and achievement in underdeveloped nations was carried out by Yangambi (2023). Quantitative research was used in this study to examine data obtained through the use of questionnaires. In his conclusion, he said that adequate school infrastructure is a prerequisite that must be met before a school can be made available to students and that administrators should recognize the value of this before placing the entire blame for students' poor performance in the classroom and in daily life on the shoulders of principals and teachers.

A study conducted by Braim et al. (2023) at the University of Sulaimani investigated the effects of dormitory living on students' academic performance. It delved into how dormitory accommodations influence academic outcomes while also considering the psychological and economic status of students. Additionally, the research analyzes the differing impacts of dormitory living based on gender and examines the attitudes of students living in dormitories compared to those residing off-campus. The findings revealed that dormitory living significantly affects students' academic success. Specifically, the psychological challenges associated with dormitory life—such as feelings of incompatibility, loneliness, discomfort, and anxiety—can negatively impact students' motivation and efforts. These emotional states ultimately hinder their ability to achieve good grades and succeed in their academic pursuits.

When institutions provide adequate accommodations and facilities, they set a strong foundation for academic success. Conversely, limitations in these areas can lead to negative psychological states and hinder learning outcomes, as shown across different cultural and geographical contexts.

### **2.2.4 Influence of Open Fields and Sanitation Facilities on Student's Academic Performance**

The correlation between school environments, specifically open fields and sanitation facilities, and students' academic performance has drawn increasing scholarly attention. Evidence suggests that physical spaces designed for outdoor activities, such as open fields, significantly benefit students' cognitive and physiological well-being, ultimately influencing their academic outcomes. Similarly, the quality and accessibility of sanitation facilities play a vital role in shaping the learning environment, affecting not only health but also educational performance.

Research indicates a strong link between open fields, physical activity (PA), and academic performance. Engaging in outdoor activities has been shown to enhance cognitive factors like memory, attention span, and executive functions. This is largely due to the physiological effects of exercise, which lowers cortisol levels—associated with decreased focus—and boosts endorphin production, fostering a more conducive learning environment. Additionally, increased blood flow to the brain supports the release of neurotrophic factors crucial for cognitive development (Donnelly et al., 2017; Krafft et al., 2014).

To understand the current state of sanitation facilities in schools, it is essential to examine various studies that highlight existing disparities in access and availability. One such study conducted by Warero (2013) reported that a total of 228 latrines for students and 57 for teachers were observed across several schools. Notably, 58% of mixed schools included boys' urinals, yet these figures starkly contrast with national standards, which recommend a ratio of one latrine for every 25 pupils. In the surveyed schools, the sources of water supply varied significantly; 30% of the schools had piped water, 20% relied on vendors, and 5% utilized boreholes. Furthermore, Warero (2013) highlighted that the ratio of latrines to pupils was particularly concerning, with an alarming figure of 45 girls per latrine equipped with a door, while for boys in schools lacking urinals, the ratio was 71 boys to one latrine. Importantly, the availability of these resources was determined to have a positive effect on students' academic performance.





In Uganda, a study by Kayiwa et al. (2022) found that schools with poor sanitation facilities tended to underperform academically. Among the parameters examined was the sanitation situation, which was shown to have negatively impacted school performance. Notably, this study was conducted at a higher educational level than the current study.

The findings underscore the importance of well-resourced educational facilities on academic performance. Science and computer labs provide essential hands-on learning opportunities that enhance student engagement and comprehension. Libraries serve as vital academic resources, offering access to materials and a conducive environment for research. Additionally, quality dormitories support academic success by providing stable, structured spaces for study and rest. Finally, proper sanitation facilities and open fields contribute to a healthier and more dynamic learning environment, collectively supporting improved student outcomes.

### III. METHODOLOGY

#### 3.1 Research Design

For its implementation, the study made use of a descriptive research approach. Orodho (2005) argues that because educational activities take place in a social context, it is beneficial to evaluate educational programs using a descriptive research approach. Krishnaswami and Ranganathan (2001) states that this architecture makes it easier to observe, describe, and investigate occurrences as they naturally occur by gathering information directly from a population at a specific moment. This methodology is great for data collecting because the study included obtaining firsthand responses from surveyed individuals while simultaneously examining existing concerns, all without altering the factors under investigation.

#### 3.2 Target Population

The study’s target group included 4574 persons consisting of 3221 form four students, 1280 teachers, and 73 principals from public secondary schools in Trans Nzoia East Sub-County, Kenya.

**Table 2**

*Target population*

Target	N
Principals	73
Teachers	1280
Form four students	3221
<b>Total</b>	<b>4574</b>

**Source:** Trans-Nzoia East Sub-county county directorate of education office(2024)

#### 3.3 Sampling Size and Procedures

The size of the sample and how it was selected are essential elements of the research project, and are examined. A sample, according to Orodho (2009), represents a tiny sample of the intended audience. In this study, the sample size was determined using a methodology established by Krejcie and Morgan. They stated that the approach ensures that the selected sample accurately reflects the larger population, enhancing the validity of the findings ( Krejcie and Morgan 1970). The data shows that a sample of 354 people, including 6 principals, 99 teachers, and 249 students, matched the target population size of 4574.

**Table 3**

*Sample Frame*

Respondents	N	$i = (N \times n)/N$	n
Principals	73	$(73 \times 354)/4574$	6
Teachers	1280	$(1280 \times 354)/4574$	99
Form four students	3221	$(3221 \times 354)/4574$	249
<b>Total</b>	<b>4574</b>		<b>354</b>

Sampling, according to Orodho and Kombo (2002), is the process of selecting a subset of people or things from a population while making sure that the chosen subset accurately reflects the characteristics of the entire group. Stratified sampling, which divides the population into segments or strata according to particular criteria, was used in this study. Seven wards in the Trans Nzoia East Sub-County served as the boundaries of the zones, and the population was made

up of form four pupils, teachers, and principals. Following the stratification of the population based on zones and roles, the researcher drew samples at random from each stratum, making sure that the total number of samples drawn is commensurate with the stratum's population size.

### 3.4 Data Collection Methods and Procedures

Questionnaires were utilized to collect information from both teachers and students in public secondary schools in Trans Nzoia East Sub-County, Kenya. Questionnaires are a set of questions with a predetermined format that researchers use to collect data in order to analyze it (Mugenda & Mugenda 1999). Six principals in public secondary schools in Trans Nzoia East Sub-County were interviewed by the researcher. The past five years' average academic success in the KCSE were gathered. According to Mugenda and Mugenda (1999), documentation analysis entails a critical assessment of recorded information, both public and private, pertaining to the topic of study.

The researcher enlisted the aid of specialists in the field who are knowledgeable in several facets of validity, including construct, criteria, and content validity. To achieve reliability, a test-retest protocol was employed. This entails repeating the same test twice over time in order to show consistent results. The Cronbach Alpha Coefficient was used by the researcher to evaluate dependability, and a Cronbach alpha of 0.7 or higher was regarded as dependable.

### 3.5 Data analysis Techniques and Procedures

#### 3.5.1 Data analysis Techniques

Quantitative data was analyzed, summarized and interpreted using frequency tables, standard deviation, percentages and central measures. To assess the quantitative data, SPSS version 26, a statistical tool for social scientists, was used. Large data sets can be handled with SPSS, which is also very efficient and time-saving (Orodho et al.2016). The analysis encompassed the calculation of frequencies and percentages, using Pearson correlation to evaluate the relationships between the variables. Moreover, one-way ANOVA was applied to compare means among different groups, as it is effective for examining variations within a single factor. The findings were subsequently displayed in table format. In contrast, the qualitative data gathered from the interviews were sorted into themes that emerged from the research questions. The findings were then showcased through selected quotations.

#### 3.5.2 Data Collection Procedures

The investigator obtained a confirmation note from Mount Kenya University's School of Post Graduate Studies after the project received approval by the Department of Education. This letter was used by the researcher to ask Kenya's National Council of Science, Technology, and Innovation (NACOSTI) for authorization to conduct research. The surveys were personally hand delivered to school stakeholders by the researcher and an employed research assistant. To help respondents feel prepared, the researcher provided guidance before distributing the questionnaires to both teachers and students. Furthermore, appointments were scheduled for interviews with the principals

## IV. FINDINGS & DISCUSSIONS

### 4.1 Response Rate

A response rate of 75.1% was obtained from the 357 questionnaires that were sent out to respondents, of which 268 were returned. The low response rate was primarily due to a shortage of both teachers and form four students across the six schools. This shortage limited the number of potential respondents, ultimately affecting the overall participation in the study. In addition to the questionnaires administered to teachers and students, interviews were conducted with 6 principals, all of whom participated, resulting in a 100% response rate for the interviews. According to guidelines provided by Mugenda and Mugenda (1999), a response rate of 70% or more is generally regarded as adequate for research. In this case, the 75.1% return rate surpasses this benchmark, ensuring that the data is sufficient for thorough analysis. This level of participation enhances the credibility of the results and reduces potential issues related to non-response bias.

**Table 4**

*Response Rate*

Category	Administered	Returned	Response Rate (%)
Teachers	99	51	51.5
Students	249	217	87.1
<b>Total</b>	357	268	75.1

### 4.2 Descriptive Statistics

The study utilized both descriptive and inferential statistical analysis to assess the impact of the availability of physical facilities on academic performance in public secondary schools within Trans Nzoia East Sub-County, Kenya. Descriptive statistics were employed to summarize and present the general trends and distributions of responses, offering a clear view of how both teachers and students perceive the state of physical facilities in their schools. Inferential statistics, on the other hand, were applied to draw conclusions and make predictions about the influence of these facilities on academic outcomes, allowing the research to establish potential relationships between facility availability and performance.

Table 5 provides a detailed breakdown of the analysis, capturing responses from both teachers and students regarding the presence and functionality of various physical facilities in these schools. Participants were asked to respond to a combination of Yes/No questions and Likert scale items. The Yes/No questions focused on whether certain essential physical facilities, such as classrooms, libraries, laboratories, and sports fields, were available and operational in the schools. The Likert scale questions allowed respondents to express their level of satisfaction or dissatisfaction with the quality and adequacy of these facilities, using a scale ranging from "Strongly Agree" to "Strongly Disagree."

By integrating both types of questions, the analysis offers a nuanced perspective on the condition and accessibility of physical resources in the public secondary schools of Trans Nzoia East Sub-County. This approach not only highlights the availability of these facilities but also captures the participants' perceptions of their functionality and effectiveness in supporting the learning environment. The data collected from these responses forms the basis for understanding how the presence or absence of key physical resources may contribute to differences in academic performance across the region.

**Table 5**

*Response for the Availability of Physical Facilities*

Questions	Yes	No
Does your school have science labs?	176	94
Does your school have computer labs?	154	116
Does your school have a library?	184	86
Does your school have dormitories?	98	174
Does your school have sanitation facilities?	267	3
Does your school have open fields for games?	262	6

From the responses gathered, it appears that while a majority of respondents believe that the overall physical facilities in the schools are adequate, there are notable concerns regarding the availability and adequacy of specific key facilities. In particular, dissatisfaction was expressed toward the library and computer labs, which were identified as areas lacking in resources or infrastructure. It's important to note that dormitories were excluded from this analysis, as the data was also collected from day schools where such facilities are not applicable. This contrast suggests that, despite the generally positive perception of physical facilities, there remain critical gaps in essential academic resources that could affect student performance and overall school experience.

To gain a clearer understanding of the respondents' perceptions of the availability of physical facilities, descriptive statistics such as frequency, percentage, and mean distribution were employed. These statistics were used to analyze responses to a five-point Likert scale measuring levels of agreement with statements regarding physical facility availability. The summarized findings, including these statistical measures, are presented in Table 6, offering a comprehensive overview of the consensus among respondents.

**Table 6**

*Descriptive Statistic for the Influence of Physical Facility Availability on Academic Performance in Public Secondary Schools*

Variable	Respondent	0	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std.Dev
Impact of science labs on academic performance	Teacher %	4 7.8	1 2.0	- -	7 13.7	18 35.3	21 41.2	3.90	1.418
	Student %	- -	7 3.2	8 3.7	17 7.8	52 24.0	133 61.3	4.36	1.001
Impact of computer labs on academic performance	Teacher %	24 47.1	4 7.8	1 2.0	5 9.8	9 17.6	8 15.7	1.90	2.062
	Student %	29 13.4	58 26.7	22 10.1	29 13.4	33 15.2	46 21.2	3.09	1.896
Impact of libraries on academic performance	Teacher %	17 33.3	- -	2 3.9	6 11.8	11 21.6	15 29.4	2.7	2.136
	Student %	29 13.4	37 17.1	15 6.9	19 8.8	38 17.5	79 36.4	3.09	1.896
Impact of dormitories on academic performance	Teacher %	17 33.3	2 3.9	- -	6 11.8	11 21.6	15 29.4	2.73	2.136
	Student %	29 13.4	42 19.4	16 7.4	28 12.9	39 18.0	63 29.0	2.90	1.843
Impact of sanitation facilities on academic performance	Teacher %	1 2.0	- -	1 2.0	9 17.6	16 31.4	24 47.1	4.18	1.014
	Student %	- -	16 7.4	12 5.5	21 9.7	41 18.9	127 58.5	4.16	1.245
Impact of open fields on academic performance	Teacher %	3 5.9	- -	1 2.0	9 17.6	14 27.5	24 47.1	4.02	1.304
	Student %	- -	16 7.4	23 10.6	22 10.1	60 27.6	96 44.2	3.91	1.277

This section presents findings on the influence of physical facilities on academic performance in government high schools in the Trans Nzoia East Region. The analysis incorporates responses from both teachers and students, evaluated through various statistical measures including frequencies, percentages, means, and standard deviations.

The data reveal a generally positive perception of science labs among respondents. A significant majority of teachers, 76.5%, either agreed or strongly agreed that science labs positively impact academic performance, with a mean score of 3.90 and a standard deviation of 1.418. Similarly, 85.3% of students shared this sentiment, with a mean score of 4.36 and a standard deviation of 1.001. This high level of agreement underscores a broad consensus on the beneficial role of science labs in enhancing educational outcomes. This observation was further corroborated by one of the interviewees who stated that;

*The availability of adequate school facilities significantly impacts students' academic outcomes. In particular, well-equipped science laboratories contribute greatly to performance, as they provide students with hands-on learning experiences that reinforce theoretical knowledge and improve understanding, especially in subjects like Chemistry, Physics, and Biology...Male interviewee, 49 years. Head teacher*

This suggests that the presence of quality physical facilities is vital for boosting academic performance, as these resources greatly influence the learning environment and student involvement. Adequate amenities improve students' study conditions and enrich their educational journey. Mohammed (2019) highlights that such facilities are a significant factor in achieving academic excellence within the educational system.

In contrast, the perceived impact of computer labs on academic performance was notably lower. Only 33.3% of teachers believed that computer labs positively influence performance, reflected in a mean score of 1.90 and a high standard deviation of 2.062. Students expressed a slightly more favorable view, with 36.4% agreeing on their positive impact, resulting in a mean score of 2.54 and a standard deviation of 1.782. These findings suggest that computer labs may be underutilized or ineffective in their current state, highlighting an area that may require attention and improvement. This was backed up by a participant who stated that;

*"The problem isn't just having a computer lab; it's how outdated and inaccessible it is. Half of the time, the lab is closed due to technical issues, and when it's open, the equipment is old and unreliable. Even if students want to learn or work on assignments, they often face problems just getting a computer to function properly. In this situation, it's hard to say the computer lab plays any significant role in boosting*



*performance. We need better resources and consistent access for it to actually make a difference." Male interviewee, 52 years male Head teacher*

These findings directly supports the first objective indicating a positive influence of science labs on academic performance. On computer labs, the study addresses the objective, suggesting that while computer labs are important, they may not have a direct impact on academic performance. Our findings align with Dyrberg et al. (2017a) who reported the idea that science laboratories are crucial for academic success. However, unlike their study, which emphasized on virtual science labs, our data suggest that physical laboratories yields positive outcomes.

The perception of libraries as a factor influencing academic performance was mixed. Only 27.5% of teachers viewed libraries as impactful, with a mean score of 1.47 and a standard deviation of 2.082. In contrast, a more substantial proportion of students, 53.9%, recognized their positive role, reflected in a mean score of 3.09 and a standard deviation of 1.896. This disparity indicates that libraries might not be fully utilized or valued by teachers, which could be a factor affecting their overall effectiveness in supporting academic achievement. This was supported by a respondent who shared the following perspective;

*"The libraries in our schools are insufficient to cater to the needs of the entire student population. In fact, I am not even sure if my school has a functional library or bookstore. However, I believe that simply having a library does not directly influence student performance. The key factor is how effectively students utilize these facilities. It's not just about the availability of resources but rather the extent to which students take advantage of them to enhance their learning."— 46-year-old female head teacher*

The current situation suggests that school facilities, such as libraries, are not given significant importance due to their limited availability. This observation is supported by Ali (2023), who reported that secondary school students often lack essential educational facilities. This deficiency adversely affects their interest and commitment to their educational pursuits, illustrating a critical gap in the resources necessary for effective learning.

This findings addresses the second objective indicating a positive influence of science labs on academic performance. Our findings align with who reported the idea that regular access to library resources is often linked to improved learning outcomes and finally good academic performance (Veena and Kotari 2016).

The impact of dormitories on academic performance received moderate endorsement from both teachers and students. 51% of teachers agreed that dormitories contribute to academic performance, with a mean score of 2.73 and a standard deviation of 2.136. Similarly, 47% of students shared this view, with a mean score of 2.90 and a standard deviation of 1.843. This indicates a general acknowledgment of the role of dormitories in supporting academic activities, though the level of agreement was not as high as for some other facilities.

This findings addresses the third objective indicating a slightly low positive influence of dormitories on academic performance. Our findings align with who reported the idea that adequate facilities in students hostels, including room comfort play a crucial role in enhancing academic performance. Conversely, limitation in this service can lead to student dissatisfaction and may hinder academic success Mushtaq and Khan (2012). However unlike their study which dealt with hostels, our data suggests that also dormitories can influence academic success.

Sanitation facilities were highly rated by both groups. A substantial 78.5% of teachers affirmed their positive influence on academic success, with a mean score of 4.18 and a standard deviation of 1.014. Likewise, 77.4% of students agreed, reflected in a mean score of 4.16 and a standard deviation of 1.245. This strong positive response highlights the critical role of sanitation facilities in promoting a conducive learning environment.

Open fields, utilized for extracurricular activities, were also positively rated. 74.6% of teachers and 71.8% of students recognized their contribution to better academic performance, with mean scores of 4.02 and 3.91 respectively, and standard deviations of 1.304 and 1.277. This indicates that open fields are valued for their role in supporting both academic and extracurricular development. This was supported by a respondent who shared the following perspective;

*Open fields help boost academic performance by giving students a space to relax and recharge. They support physical activity and sports, which improve motivation and concentration. — 56-year-old male head teacher*

This suggests that the quality of physical facilities plays a crucial role in enhancing the effectiveness of teaching and learning, which in turn impacts academic performance. Man (2019) asserts that having access to well-maintained educational facilities, like open spaces and modern classrooms, makes the learning process more engaging and effective. These resources support interactive and hands-on learning, helping students better grasp and retain the material. For instance, outdoor areas provide opportunities for physical activities and practical exercises.

Overall, the data demonstrates a strong consensus on the importance of certain facilities, such as science labs, sanitation facilities, and open fields, in supporting academic performance. However, the lower ratings for computer labs and libraries, particularly from teachers, suggest that these areas may require enhancements to better serve their educational purposes and improve academic outcomes.

### 4.3 Inferential Statistics

The Pearson correlation analysis at a significance level of  $p \leq 0.05$  revealed a statistically significant relationship between physical facilities and academic performance of learners in public secondary schools in Trans Nzoia Sub-County, Kenya. This is summarized in Table 7. The analysis aimed to test the following hypothesis:

$H_{0i}$ : There is no significant association between physical facilities and academic performance of learners in public secondary schools in Trans Nzoia Sub-County, Kenya

**Table 7**

*Pearson Correlation Analysis*

		Physical facility availability	Academic performance
Physical facility availability	Pearson Correlation	1	
Academic performance	Pearson Correlation	.968**	1

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

The Pearson correlation coefficient between physical facility availability and academic performance is  $r=0.968$ . The analysis shows a very strong and statistically significant positive correlation between physical facility availability and academic performance. This suggests that improvements in the availability of physical facilities are strongly associated with enhancements in academic performance. The high correlation coefficient (0.968) and the significance level (0.00) underscore the robustness of this relationship, indicating that the availability of physical facilities and better physical facilities are likely to have a substantial positive impact on academic outcomes.

## V. CONCLUSION & RECOMMENDATION

### 5.1 Conclusions

The study concluded that physical facilities play a critical role in enhancing academic performance. Adequate facilities, such as science laboratories, were recognized for their significant contribution to improving student outcomes, particularly in science subjects. Sanitation facilities and open fields were also appreciated for creating a conducive learning environment. However, concerns were noted regarding the inadequacy or under-utilization of computer labs and libraries, which potentially hindered their positive impact on student performance. The Pearson correlation analysis confirmed a strong positive relationship between the availability of physical facilities and students' academic achievement, reinforcing the need for investment in educational resources.

### 5.2 Recommendations

The study emphasizes the importance of having well-maintained physical facilities for improving student performance. Therefore, it is recommended that educational authorities and school leaders focus on upgrading school infrastructure.

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