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## Relationship between Physical Facilities and Students Performance in Biology in Secondary Schools in Nandi County, Kenya

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### **Abstract:**

*School Physical facilities is a key base for learning in all institutions. They include classrooms, science laboratories, libraries, dormitories and recreational facilities. Classrooms play a key role in day to day formal teaching and learning. The libraries enable learners to get an opportunity to conduct their personal studies or carry out research as the research materials are found there. Recreational facilities are important for co-curricular activities that enable learners to be psychologically and physically fit. Dormitories on the other hand enable students to be housed in schools to hence finding enough time to carry out their studies. Physical facilities that have been put up in schools vary to enable teaching and learning for quality education. The purpose of this study therefore was to establish the relationship between physical facilities and students' performance in biology in secondary schools in Nandi County, Kenya. The study was guided by systems theory whose proponent is Bertalanffy and adopted ex post facto research design namely the causal comparative. The study population comprised of 125 secondary schools in Nandi County, Kenya. Stratified sampling was used to select 25 schools. A total 25 principals and 25 directors of studies were included in the sample. Data was collected using questionnaires, document analysis schedule and observation schedule. Descriptive statistics used in analysis included frequencies, means and percentages. Hypothesis was tested using, Anova at  $\alpha = 0.05$ . The study established that there was no statistical significance relationship between the level of availability of physical facilities and students' performance in biology. The study concluded that there is a relationship between the level of availability of physical facilities and students' performance in biology in secondary schools. The study recommended that the government should allocate all schools equal resources yearly to enable the establishment of physical resources.*

**Keywords:** Physical facilities, biology, student's performance

### **1. Introduction**

In Pakistan, Arab, Waseem & Nasim (2012), conducted a study on the analysis of the available school buildings, rooms, play grounds and their impacts on students' academic achievement, behavioral and personality development. The research adopted a quantitative design for empirical data on student's educational and behavioral performance in relation to physical infrastructure. 300 respondents of four selected boys' high schools coded as Government High School Number-1 GHS1, GHS-2, GHS-3, and GHS-4 were selected using Stratified sampling technique. The sample was from two selected towns of Thana and Batkhela. Interview schedule was the instrument used in data collection. The collected data was finally classified and coded with the specific observations, distributed into frequencies in tables along with discussion in various dimensions of the research.

Results showed that physical facilities have multiple impacts on students' academic performance. It was further revealed that class participation and other activities related to class were promoted due to availability of physical facilities. 73% of students supported the statement to a greater extent while 82% of the sample data reflected that the physical facilities at school enhance students' confidence level to a major extent. Besides, the information from the field data indicated that students' learning and motivation for class participation was increased by the availability of physical facilities. The information thus concluded that adequate physical infrastructural facilities highly influence students' academic achievement and personality development positively. The study focused on physical facilities and academic achievement in general. However, the current research focused on physical facilities and biology in specific. In addition questionnaires, document analysis schedule and observation schedule were instruments used to collect data, not interview schedule.

In Ethiopia, a study on school physical facilities and their influence on the quality of education was done by Afework and Asfaw (2014). 24 primary schools in Eastern Hararge zone and 12 primary schools in Harari regional state were involved in the study. Its major objective was to find out the extent to which availability of school facilities affect the quality of education. The study sample was selected using simple random sampling technique. The research sample included school principals and heads of regional education bureau. Questionnaires, interview guide and observation schedule were the research instruments used to collect data. Data was analysed using descriptive statistics such as percentages, frequencies, means and grand means.

Research findings revealed that the physical facilities and instructional materials were not available, less in quantity and quality. Most primary schools lacked school facilities that help to effectively facilitate teaching and learning activities. Information obtained from the data gathered showed that school facilities such as: classrooms, computers, library and laboratory services were inadequate. This in turn impacts negatively on teaching learning activities, teacher and student's motivation and managerial ineffectiveness. It was summarized that the inadequacy of instructional materials and school facilities highly affected the teaching learning process and prevent the schools from improving the quality of education. This study differs from the current study in that the research design used in conducting the research was not stated. In addition, the study was carried out in government primary schools while the current research was done in secondary schools.

Koroye (2016), in Nigeria conducted a study to empirically investigate the extent to which students' academic achievement in secondary schools is influenced by the physical school environment in Bayelsa State. Ex-post facto research design was adopted in the research. One thousand, six hundred and twenty JS3 students were carefully selected by multiple stages sampling techniques. Questionnaires and an achievement test were the selected research instruments for collecting data. The data collected from the questionnaires administered to the respondents were coded and subjected to statistical analysis using simple percentage and Independent t- test (t).

Findings revealed that students' academic achievement is greatly influenced by the aesthetic beauty of the school and infrastructural facilities. Also, school equipment and instructional materials influence students' academic achievement significantly. A recommendation was made that the Government should provide adequate physical facilities in all secondary schools in Bayelsa State to enable students engage in fruitful activities. The research design used appropriate and same for the current study even though the target population and the technique of sampling not stated by the author. The study differs with the current study as the current used content analysis schedule, observation schedule and a questionnaire as research instruments. From the findings, it is clear that appropriate physical facilities motivate teachers and learners thus stimulate positive learning hence good biology academic realized.

Umar, Fugu, & Aliyu (2018) conducted a study to examine the predictors of academic achievement in biology among public secondary school students in Kwara State, Nigeria. Four objectives were used in conducting the study. Survey and correlational research design were used. Simple random sampling technique was used to select 242 biology teachers from 293 secondary school from 16 the local government. Questionnaires were used in data collection. Pilot studies were conducted to test for reliability. The collected data for the study was analyzed using statistical package for social science (SPSS, 20). Four hypotheses were tested at 0.05 level of significance using chi-square and regression. Data was presented through mean, standard deviation and percentages.

The study findings revealed that, there was a strong positive relationship between physical facilities and students' academic achievement. There is moderate positive relationship between school libraries and students' academic achievement and strong positive relationship between school laboratories and students' academic achievement. The study is the same with the present study as it also used simple random sampling, questionnaire, data presented through mean, standard deviation and percentages. The current study conducted in Kenya which is a different environment from Nigeria. From the findings, it is clear that improved students' academic performance is strongly attached to presence of adequate physical facilities and hence appropriate facilities ought to be availed in all secondary schools.

A correlational survey study was conducted by Musah and Umara (2017) on the effects of availability and utilization of biology laboratory facilities on students' academic performance in secondary schools in Yobe State, Nigeria. The target population of the study was made up of all the 42 biology teachers and 10,231 biology students in all the senior secondary schools in Yobe state. Stratified random sampling was used to select a sample population of 370 biology students. All the 42 biology teachers were included in the study since the size was manageable. Two research questions and one null hypothesis tested at 0.05 level of significance guided the research. Data collection instruments included; a questionnaire containing a checklist (Biology Laboratory Facility) and a Proforma. Data from research questions were analyzed using standard deviation and mean. Hypotheses were tested using Pearson Product Moment Correlation Coefficient and Multiple Correlation analysis. The reliability coefficient of the instrument was obtained using Cronbach Alpha and was established to be 0.84.

The results of the study established that biology laboratory facilities are either not available, or when they are available they are inadequate hence cannot be utilized by most students. The results further established that there was a significant relationship between availability and utilization of biology laboratory, and student's academic achievement. The study was different from the current study in terms of survey design. The current research adopted ex-post facto design mainly the causal comparative.

Bakari, Likoko, & Fredrick (2014) in Bungoma South, Kenya conducted a study to determine the effects of physical facilities on achievement in Kenya Certificate of Secondary Examination in Public Schools. The study was guided by a conceptual framework which stems from the performance plan in academic achievements in schools. Purposive sampling was used to select 15 schools from 20 targeted schools. The target population was made up of 140 respondents.

Descriptive survey research design was adopted for the study. Questionnaires, Interview schedules and Observation schedules were the data collection instruments used for the study.

The key results of the study revealed that Physical facilities were available and well utilized to encourage learners to perform well in KCSE examinations. The descriptive survey research design used was appropriate even though use of interview schedules needs qualitative design and sample units not clearly stated. From the findings it is clear that physical facilities play a crucial role in students' academic achievement.

The reviewed study concurs with the current research in terms of sampling technique but differed in the research design as the current employed ex post facto design. Pearson Product Correlation Coefficient in reliability test is not used for testing hypothesis as used in the study but a method of establishing the strength of association between two variables. Hypotheses in the current research were tested using Anova and chi-square test of independence. From the findings unavailability of laboratories are detrimental to biology academic achievement therefore from the researchers view, the said facilities should be available and accessible by students in all public secondary schools.

## 2. Statement of the Problem

In a troubling trend, performance in biology has been declining from the year 2015-2019 in secondary schools in Nandi county. For three consecutive years, performance in the subject has been on a downward trend with only a small number getting grade B and above. The trend is raising concerns that many bright students will be locked out of studying lucrative and challenging professions like; Medicine, Nursing, Pharmacy, Biochemistry, Biology education and Microbiology among others. Poor academic performance in biology among secondary schools has led to questionable, teaching methodologies, inputs and outputs of curriculum implementation. This is due to poor results realized from Kenya national examinations council which has led to frustrations and disappointments among students and other stakeholders. According to statistics from Nandi county education office the results of biology indicates that the performance from Kenya National Examination Council (KNEC) are far below average at an average mean of between two to five depending on the level of schools.

Muendo (2016), conducted a study on the influence of school infrastructural environment on performance of KCSE in Kibauni division of Machakos County, Kenya. He found out that classroom, laboratories, library and dorms had negative influence on academic performance. Thus need to be improved. Otieno and Wanzala (2017), gave a report that in the year 2016, only 18% candidates who sat for the biology examination got at least grade C a drop of more than half compared to 2015 when 40% of the candidates attained the grade of C. In 2016, candidates who scored D- and E in biology were almost triple (48%) that of previous year. 18% of the candidates got the same grades. On the opposite side of the score card only 1% candidates got either A or A- in 2016 a fall from 4 % previous year and 5% in 2014. The mean grade attained in the subject last year dropped 2 places to D from C-.Therefore this study investigated the relationship between physical facilities on students' performance in biology in secondary schools in Nandi County, Kenya.

## 3. Methodology

The study was conducted in Nandi County, Kenya. Expost-facto research design was employed mainly the causal-comparative design. The target population was 125 secondary schools. Stratified sampling was used to select schools. Teachers of selected schools were automatically included in the sample. Data was collected using questionnaires, document analysis schedule and checklist. Data coding was done and then analyzed by use of a computer software SPSS. Descriptive statistics used in data analysis included frequencies, means and percentages Hypothesis was tested using Anova.

## 4. Results

The researcher used the questionnaire responses from the principals to find out the level of physical facilities in schools. A document analysis schedule was used to get the Biology mean scores of the in regard to physical facilities available. The results were presented in the table below 1 below.

Level of Availability of Physical Facilities					
Biology mean scores	1(not at all)	2(little extent)	3(moderate)	4(great extent)	5(very great extent)
2.0-2.9	0	6	0	0	0
3.4-3.9	0	0	8	0	0
4.0-6.9	0	0	0	10	0
8.0-8.8	0	0	0	0	1
Total	0	6	8	10	1

Table 1: Level of Availability of Physical Facilities and Biology Mean Scores

The study found as shown in table 1 that there was a greater performance in biology in a school with very great extent of availability of physical facilities. A mean score of 8.8 was registered. However, a mean score of between 2.0-2.9 was recorded in schools with less availability of physical facilities. Schools with moderate facilities recorded a mean score of between 3.4-3.9 while schools with great extent of physical facilities registered a mean of between 4.0-6.9. This implies

that when physical facilities are available and adequate, students become motivated to learn hence better results are achieved.

Information obtained from the data gathered showed that school facilities such as: classrooms and facilities, computers, library and laboratory services are inadequate. This in turn have a negative impact on teaching learning activities, teacher and student's motivation and managerial ineffectiveness. Therefore, the inadequacy of school resources and instructional materials highly affected the teaching learning process and prevent the schools practice for improving the quality of education.

This finding agrees with the findings of Arab, Waseem & Nasim (2012), on the analysis of the available school buildings, rooms, play grounds and other such physical facilities and their impacts on students' academic performance, behavioral and personality development. Results showed that physical facilities have multiple impacts on students' academic performance and that class participation and other class related activities were promoted due to physical facilities. The statement was supported by a majority of 73% students to a greater extent while 82% of the sample data reflected that physical facilities at school enhances students' confidence level to a major extent. Besides, the information from the field data indicated that availability of physical facilities increased students' learning and motivation for class participation. The information thus concluded that physical infrastructural facilities highly influence students' academic performance and personality development.

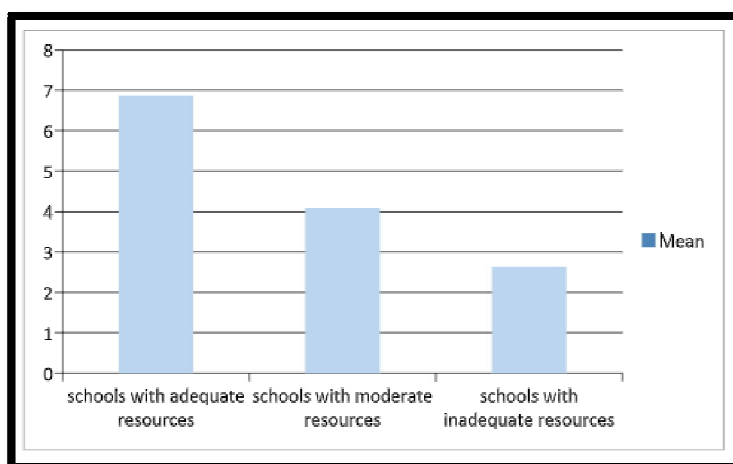


Figure 1: Biology Performance in Relation to Adequacy of Physical Facilities

The study found out as shown in figure 1 that schools with adequate physical facilities posted a higher mean score, schools with moderate physical facilities post an average mean score while schools with inadequate physical post a lower mean score in biology. This implies that when the physical facilities are adequate, utilization becomes efficient hence better academic performance is realized.

These findings are in agreement with the findings of Afework and Asfaw (2014) who established that, school facilities and instructional materials were unavailable, less in quantity and quality. The primary schools lacked school facilities that help to effectively run teaching and learning activities. Information obtained from the data gathered showed school facilities such as: classrooms and facilities, computers, library and laboratory services are inadequate. This in turn have a negative impact on teaching learning activities, teacher and student's motivation and managerial ineffectiveness. It was concluded that the inadequacy of school resources and instructional materials highly affected the teaching learning process and prevent the schools practice for improving the quality of education.

The relationship was further tested under the null hypothesis that:

- Ho: There is no significant relationship between the level of availability of physical facilities and students' performance in biology in secondary schools in Nandi County, Kenya.

This hypothesis was tested using Anova at 0.05, significance level. The results were as presented in the table below:

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	54.565	13	4.197	5.338	.004
Within Groups	8.649	11	.786		
Total	63.214	24			

Table 2: Anova Summary Table

The results in Table 4.12 above, shows that the significance value was 0.004. Since the observed value (0.004) was less than 0.05, we reject the null hypothesis that states that; there is no significant difference in mean of biology achievement scores of students who attend schools with different levels of physical facilities. Therefore, it was concluded that there is a statistical significant relationship between the level of availability of physical facilities and students' performance in biology in secondary schools in Nandi County, Kenya.

## 5. Conclusions and Recommendations

It was concluded that there was a higher availability of classrooms, moderate availability of laboratories and dormitories and a lower availability of libraries and recreational facilities. The findings on the status of library facilities from the observation schedule and questionnaires with school principals indicated that library facilities in over 89% of the schools were either inadequate or non-existent. Only 11% had a well-equipped library, 40% had under-resourced libraries while in another 49% the library building or resources were non-existent.

The study also established that, the level of availability of physical facilities is not influenced by the type of school. For instance, it was noticed that, there is a higher availability of physical facilities in sub county schools compared to county schools. In addition, school location according to the findings does not influence the availability of physical facilities.

In addition, Information obtained from the data gathered showed that school facilities such as: classrooms and facilities, computers, library and laboratory services are inadequate. This in turn have a negative impact on teaching learning activities, teacher and student's motivation and managerial ineffectiveness. Therefore, the inadequacy of school resources and instructional materials highly affected the teaching learning process and prevent the schools practice for improving the quality of education.

Based on the results of the research questions, the researcher made the following recommendations:

The government should allocate more funds to equip physical facilities in schools which are either inadequate or completely lacking, also more funds should be allocated to equip schools with reference materials required for supplementary learning.

The Ministry should also invests in the school facility expansion. Thorough check should be done in schools to ensure equal distribution of resources yearly.

The researcher recommends that the government should build more schools to meet the rising yearly enrolment surges to avoid overcrowding of physical facilities, stretch of teaching and learning materials and overworking of available teachers which in turn would compromise the quality education

Head teachers should involve all education stakeholders to aid in school development programmes and projects. The schools should also initiate income generating projects to subsidize government funding. Finally, Communities need to embark on initiatives to tap funds to ensure that the school facilities are replenished.

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