



## STUDENT PERFORMANCE IN BIOLOGY: RACHUONYO NORTH SUB-COUNTY, HOMABAY COUNTY-KENYA AS THE CASE STUDY

BY

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### Abstract

*This study was carried out in Homabay County, Rachuonyo North Sub County to determine factors responsible for underperformance of in Biology. It was considered because it's compulsory and so, it's expected of student to do well in the subject. This study had the following objectives; to establish the attitude of the teachers and learners towards the subject, to determine how teaching methodology affect the performance of students in Biology and also to establish how resources and facilities affects the performance of learners in Biology. The study had a conceptual framework that had three variables. Teaching methodology, attitude of learners and teachers as well as teaching and learning resources formed part of the independent variable. Excellent performance in Biology at KCSE level formed part of the dependent variable. The research targeted a population sample of 388 (380 students, 4 teachers and 4 principals) and this meant that during the data analysis, n was equated to 388 where applicable and to 4 where applicable. The study used descriptive survey design. A descriptive survey design was a process of collecting data so as to answer questions concerning the current status of the subjects in the study, Descriptive research design was used in preliminary and exploratory studies to allow research to gather information, summarize, present and interpret for the purpose of clarification. A simple random sampling was used. This method was appropriate since it allows each member of the learners to have equal chances of being included in the sample. The research instruments used included questionnaire and interviews. After the questionnaires and interview schedule were completed, the qualitative data obtained was analyzed. Then the findings were presented through tabulations. Quantitative data collected was analyzed and the results were presented using percentages, means, frequency distribution table, bar graphs and pie charts. The study found out that in the sub county, attitude of students towards the subject, teaching methods as well as resources and facilities greatly affected their performance in Biology. On the teaching method, it was found out that demonstration was the most preferred teaching method. The study recommended that sessions of guidance and counselling should be organized in these secondary schools, so as to boost student's attitude and interest in the subject, the government and parents to get involved in funding projects in the school and ensure that resources such as laboratories are made available, and that teachers should be re-tooled on the appropriate teaching methods for Biology. The findings would enable learners to appreciate Biology as an important core subject in the secondary Curriculum, for it leads to careers in human health, animal life and that of plants.*

**Keyword:** Biology, Student, Teaching, Teachers and Study Materials

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## 1. INTRODUCTION

As the world grows increasingly in technology and science advances, there is need to be scientifically literate to match the time and progress. Science has become ideal subject to help improve life and students' thinking ability and understanding, which in turn permits students to form their own knowledge and creativity through active investigation of objects and events in and around them (Hnin and Khine, 2020).

In measuring the successes and achievements over decades in biological science one can convincingly testify that humanity has landed in a century, which can be named biology century. The biology today has become a way of not only study intellectually, but also a direct and indirect impact on the living world as a whole. The means by which creativity in designing and constructing bio-aided equipment and tools to support life (plants and animals) are growing is becoming more interesting. With the growth and development of



biology and the implementation of its plans in the life of human society, the influence on people for whom biological education will be an element of their professional training will skyrocket (Mbelle and Katabaro, 2003). Manfully, the relevance of biological education in our secondary schools is no doubt increasing by the day. The subject “Biology” under discussion contributes in no small measure to formation of a scientific worldview among learners and instructors in the world and man and it should be encourage to strive further (Ziyadulla Mardonov, 2019).

Traditionally, a whole lot biology was taught and evaluated in different ways that impact but little in promoting students’ interest and enthusiasms. Furthermore, Biology was perceived as being descriptive most of the times erroneously, demanding little in the way of mathematics and lacking opportunities for practical-based experimentations (SOB, 2014, Jenkins, 2016). During the evolutions of certain progresses such as the launch of Journal of Biological Education, a whole lot of changes came to be. Somewhere at about 1960, there came a world-wide interest in curriculum renewal that led to moves for reformation in several countries of the world (developed and developing countries). Like in Anglophone Africa, the African Primary Science Project among three projects sponsored by the Education Development Centre based in Massachusetts in the USA has been in the limelight today (Jenkins, 2016, Kithyo and Petrina, 2017).

The subject offers students the opportunity to engage with the diversity of living organisms and their vast environment. It enables learners to comprehend their own bodies and the changes they experience, first hand benefits and to apply a vast available approaches to investigating and exploring the living world limitlessly (Ziyadulla Mardonov, 2019).

## 2.0 METHODOLOGY

### 2.1. Research design

The study used descriptive survey design. A descriptive survey design defines collecting data so as to answer questions concerning the current status of the subjects in the study. Ebrahim, Y.H (2017). Descriptive research design was used in preliminary and exploratory studies to allow research to gather information, summarize, present and interpret for the purpose of clarification (Murithi, 2016). Borg and Gall (2017) note that the descriptive survey design is intended to produce statistical information about aspects of education that interests policy makers and educators. The descriptive survey design was employed, this is because it guaranteed breadth of observation and it also provides for accurate descriptive analysis of characteristics of a sample which was used to make inferences about population (Ebrahim, Y.H (2017).

### 2.2 Area of study

Rachuonyo North Sub County has Humidity which is high with potential evapo-transpiration rate between 2000 and 2200mm per year. Annual temperature in the sub county range from 17 to 34° C. The sub county is located in Homa Bay County at 0.6221° S, 34.3310° E in Kenya. The Sub-County is part of Homabay County that is endowed with major tourism attraction sites including Ruma National park,

Kanjera archeological site, Simbi Nyaima (volcanic Crater Lake), Mfangano and Rusinga Islands. Homabay County is divided into seven agro-ecological zones namely upper Midland (UM 1), coffee tea zone, Upper Midland (UM 3); Marginal coffee zone, Upper midland (UM 4); sunflower-Maize zone, Lower Midland (LM 2); Marginal sugar zone, Lower Midland (LM 3); Cotton zone, Lower Midland (LM 4), Marginal cotton zone, Lower Midland (LM 5); Livestock-millet zone (Opere et al, 2016).

### 2.3 Target population

The target population for this study consisted of students, teachers and the principals in the selected secondary schools in Homabay County, Rachuonyo Sub County. The population for the sample size was 380 students, 4 teachers and 4 principals.

### 2.4 Samples and sampling techniques

The adopted method was a selected group from the targeted population on which the study information is obtained. Ngechu (2004) explains vividly the importance of selecting a representative sample through making a sampling frame. In this work, the sample of interest comprised mobile schools head teachers, teachers and students. The researcher adopted purposive and saturated sampling techniques. Saturated sampling is used when the population is too small. The research involves all the participants in the study while purposive is when a researcher selects the participants with the desired characteristics only.

Table 1: Sample Frame

Category	Population	Sample	Percentage (%)
Head teachers	4	4	100
Students	1500	380	30
Teachers	8	4	50

### 2.5 Sample Size

According to a research, a simple size sample should be at least 30% of the target population. Hence the sample size of the study was 380 students. This was 30% of the total number of students in the schools that were considered for the research (Edwin, 2020).

Table showing Sample distribution of study respondents

School	Category	Sample size
Got Rateng’ secondary school	Sub county	90
Gendia High school	County	90
Oriwo Boys High	Extra county	100
Homa bay High school	Extra county	100
<b>Total</b>		<b>380</b>

### 2.6 Instrumentation

Questionnaires were used to obtain data from the students through an interactive process between the respondents and the researcher. Three sets of questionnaires were administered; student's questionnaires, teacher's questionnaires and the principals' questionnaires.

**2.7 Questionnaire for students**

A questionnaire is a set of questions or statements that assess attitudes, opinions, beliefs and biographical information (Haradhan, 2020). Boynton and Greenhalgh (2004) reveals that questionnaires helps anonymity, permit use of standardized questions, have uniform procedures, provide time for the participant to think about the responses and are easy to score. This study used a questionnaire because the population under study was literate and so one could read the items and pen down their responses. An interview was administered, it is a structured conversation where one participant asks questions, and the other makes answers available (Haradhan, 2020).

**Observation schedule**

In this research, observation employed the senses also involved the perception and recording of data via the use of scientific instruments.

**Validity**

Validity refers to the extent to which an instrument measures what it was intended to measure. Therefore, an instrument is considered "valid" if it measured what it set out to measure. Validity is associated with quantitative data collection, and requires various statistical techniques and concepts to establish. Face validity was incorporated. This is an informal review of a questionnaire by non-experts, who assess its clarity, comprehensibility, and appropriateness for the target group, who are students taking Biology in Rachuonyo Sub County (Moskal and Beata, 2014).

**Reliability**

Reliability is the degree to which an assessment tool produces stable and constant result.

Other researchers must be able to perform exactly the same experiment under the same conditions and generate the same results (Moskal et al, 2014).

The same sample took both instruments (questionnaire and interview) and the scores from both instruments were correlated. If the correlations were attained, then the instrument can be said to be reliable.

**2.8 Data collection**

To proceed with interview, permission was sought from the Sub county Education office. Upon getting the permit, the researcher made an appointment to visit the schools to get permission from the authority. The researcher then administered questionnaires which were filled in by the selected respondents (students, teachers). This was done seamlessly with support from research assistants. All were initiated by permission from Maseno University, school of graduate studies.

**2.9 Data analysis procedure**

After the questionnaires and interview schedule were completed, they were collected, the data were then coded appropriately and entered into the computer for analysis. Qualitative data obtained were analyzed (Adenyi, 2017). Then the findings were presented through tabulation. Quantitative data collected were analyzed by use of descriptive statistics including percentages means and frequencies. It was presented in frequencies tables, bar graphs and pie charts (Kaliyadan and Kulkarni, 2019).

The process of data analysis involved editing, coding and data entry into a computerized system for onward analysis. Qualitative data were grouped into themes corresponding with the study objectives, whereby outstanding themes from the statements provided by the interviews were formed from outcome of the specific question (Smith et al, 2015).

The primary data collected from the questionnaires were registered, coded and translated so as to answer the research questions of the study. Descriptive and inferential statistics were majorly used in data analysis in this study (Guetterman, 2019).

**3. DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS**

**Background Information and Characteristics of the Sample**

The study sample consisted of 4 school principals out of whom 2 were male while 2 female, 4 teachers of Biology out of whom 3 were female while 1 was a male and 380 form 4 students, out of whom 200 were male while 180 were female as indicated in Table 2

**Table 2 showing characteristics of the sample**

Types of respondent	Male	Female	Male (%)	Female (%)
Principals	2	2	50	50
Teachers of Biology	1	3	25	75
students	200	180	52.63	47.37
<b>Total</b>	<b>204</b>	<b>184</b>	<b>52.58</b>	<b>47.42</b>

*Source: Data from the field*

KCSE- Kenya certificate of secondary education

TSC- teachers service commission

TPAD- Teachers' performance and appraisal development tool

CAT- Continuous Assessment test

**Table 3: School category, number and their sex status (n=4)**

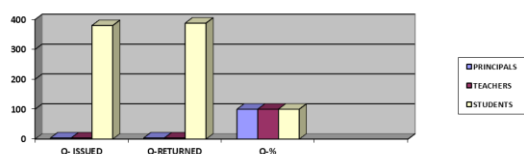
School category	Boys boarding	Girls boarding	Mixed day school	Mixed boarding
National school	0	0	0	0
Extra county schools	2	2	0	0



County schools	1	0	0	0
sub county schools	0	0	1	

**Table 4: Number of Questionnaires issued and their return rate (n =388)**

Respondents	Questionnaires issued	Questionnaires returned	% of questionnaires returned
Principals	4	4	100
Teachers	4	4	100
Students	380	380	100
<b>Total</b>	<b>388</b>	<b>388</b>	<b>100</b>



Source: Data from the field

The above graph represents the returned table as shown above.

The questionnaires return rate for school principals was 100% meaning all the 4 participated. Teachers of Biology questionnaires return rate was 100% meaning all the 3 participated. Finally, student’s questionnaires return rate was 100%. In summary, out of the 388 instruments administered, all were returned.

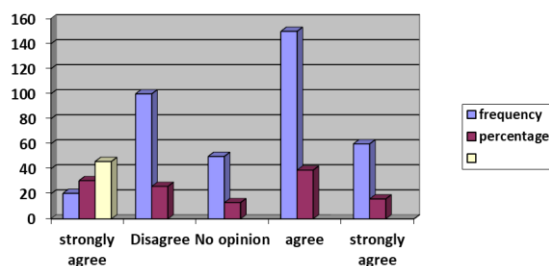
The major research findings obtained from this study in line with its specific objectives can be analyzed and discussed as follows:

**Resources and facilities**

**Table 5 Student’s response on availability of teaching and learning resources at school.**

Rating	Frequency	percentage
Strongly disagree	100	26
Disagree	50	13
No opinion	20	5
Agree	150	39
Strongly agree	60	16
Total	380	100

The above can be represented graphically as shown below;



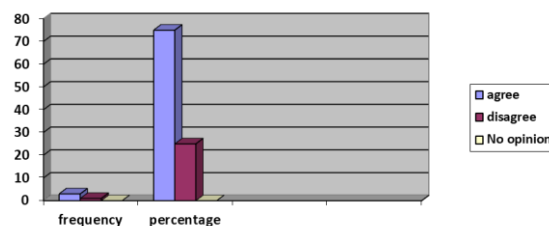
The second highest percentage (26%) of the students who answered the questionnaires strongly agreed that the poor performance which is being experienced now is due to lack of enough resources. The teachers also cited this as major factor since students and teachers lack the relevant information, they require in order to enable them perform well in their examinations. The textbooks are not enough and the supplementary books were not available even in the schools that had a library

On the other hand, the teacher’s response on the availability of resources was at close range. This was due to the fact that some schools had enough and variety of textbooks, a well-equipped library while others had a library and few books. Inadequate of these resources results to students not preparing well for their examinations hence poor results. The same is represented in the table below

**Table 6 Teachers response on the availability of Resources and facilities**

Rating	Frequency	percentage
Agree	3	75
Disagree	1	25
no opinion	0	0

The above can be represented in a graph as shown below;



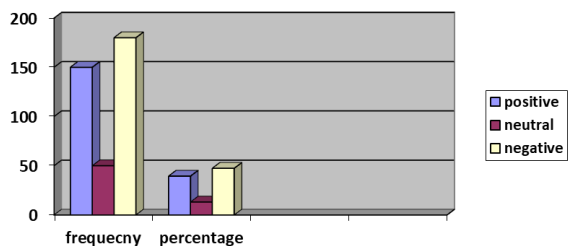
Teaching and learning materials are essential for teachers and students use for interact in order to achieve certain objectives in a classroom situation such as maps, projectors, text books, computers, models, board etc. Those materials help the students to see, touch and hear. In so doing they are able to conceive abstract information from concepts, practice some skills and draw some conclusions out of what they are handling. Teaching materials can be audio, printed or non-printed. The use of teaching materials helps the students retain the good part of what has been presented particularly when the students are manipulating the materials themselves. Generally, teaching materials are part and parcel of the elements of teaching which enable the students to get set for the lesson, arouse their interest and provoke enquiry minds. Further, teaching materials help to develop concepts among students and standardize the information being presented by teachers as well as their needs. The study found out that these resources and facilities are so limited, and this has contributed to lower academic performance In Biology in Rachuonyo North Sub County (Mbelle and Katararo, 2003, Kaliyadan and Kulkarni, 2019).



**Attitude**

**Table 7 showing categories of students attitude towards Biology (n=380)**

Response	Type of attitude	Frequency	Percentage
What is your attitude towards Biology?	Positive	150	39.47
	Neutral	50	13.16
	Negative	180	47.37



From the above table, it is clear that majority of the respondents gave feedback that the students in question have very poor attitude towards the subject. This was represented by a percentage of 47.37%. 39.47% responded that students have positive attitude towards Biology. However 13.16%, did not indicate whether they have positive or negative attitude. Declining morale and attitude has serious implications for the retention of teachers as well as their performance. Motivation is key to career path projections, promotion and opportunities for progressions. In the same vein, promotion opportunities within the profession are often challenging and as a result many skilled teachers refrain from the classroom while others become demotivated because of poor remuneration and status recognition in the society. Teachers are demoralized by the level of inhuman treatment and information on the promotion process and decisions of the authority on the end (Fry, 2003). Teachers need both support and supervision throughout their careers.

**Teaching methods**

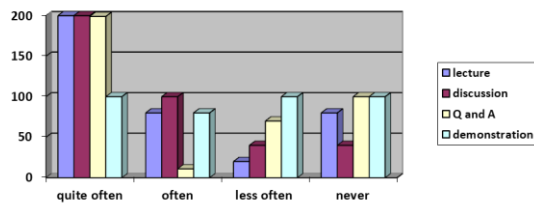
This section represents the responses of the students on the extent to which instructors follow the teaching methods. The data is presented in table below.

**Table 8. Extent teachers follow teaching methods**

	Quite often	Often	Less often	Never
Lecture	200	80	20	80
Discussion	200	100	40	40
Questions and answers	199	11	70	100
Demonstration	201	67	20	100

Source: Research data, 2024

The information in table 8 can be presented graphically as shown below



According to the study findings, the teaching methods that the students felt were most effective and was employed in teaching Biology in class were as shown in the table above. The majority of student respondents felt that demonstration was the most frequently used method employed in Biology and had the highest percentage of preference.

The students indicated that the most frequently used method of teaching in their schools was demonstration hence it was employed as a teaching methodology that influenced students' KCSE performance in Biology.

**4. SUMMARY**

Biology as a subject is a vital subject at secondary schools in Kenya. Despite the efforts geared towards improving the overall performance, the failure rate in the recent past has been high, owing to some factors but not limited to the following: School based factors such as inadequate teaching and learning resources. Students (personal) factors such as negative attitude towards the subject. Social-economic factors such as unsatisfied basic needs at home and high cost of living. To address those problems, the following should be noted, ensuring that the required materials (modern teaching aids and laboratory equipment) and resources are provided to all the schools (public and private) to embrace technology in teaching and learning process. Adequate training of instructors (teachers). The curriculum developers must incorporate the view of stakeholders in the whole process. The syllabus should be revised regularly to accommodate research findings, innovation and information/technological progressions.

**5. CONCLUSION**

The findings of this study indicates that there are significant effects of performance in Biology subject due to lack of enough teaching and learning resources. Students were also found to have failed the subject due to inappropriate teaching methods that are employed in teaching of Biology, as well as attitude of both teachers and students towards Biology.

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