Comparative Study Of Biology Performance And Resources Availability In Two Selected Schools Of Kikuyu Division Of Kiambu District.

By

Martha Wanjiku Wangai
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DECLARATION

This project is my original work and has not been presented for any of the study programme in any other university.

MARTHA WANJIKU WANGAI

This project has been submitted for examination with our approval as PGDE project advisers.

1. Name of Adviser

DR. F. N. GETAO

2. Name of Adviser

DR. MACHARIA
ABSTRACT

Biology is one of the science subjects on the Kenyan secondary education which was introduced in the education system since the dawn of independence. In the 7-4-2-3 system, biology was compulsory in O-level in all schools but offered as an optional subjects in A-level.

However, with the implantation of the 8-4-4 education system in 1986, biology was made compulsory system in all schools. From that time of commencing of the system, there have been numerous problems being experienced in all the schools ranging from lack of textbooks, facilities among other factors. This has been attributed to lack of enough time given before the 8-4-4 system was implemented and the repercussion is that of poor performance in most secondary schools.

This study was therefore conducted to find out whether there is a relationship between resources availability in a school on biology performance.

The sample population included two schools (government assisted and a harambee schools) selected for the study. Data were collected by questionnaires personal visits, interviews and observations. The field survey was carried out during the months of May and June, 1996 and was greatly limited by inadequate time and funds. Data were
analysed and results tabulated discussed and presented in tables of percentages and in form of bar graphs. The study revealed that the resources available in a school has a great role to play in biology teaching hence good performance. Lack of facilities in a school ie inadequate supplies of textbooks, laboratory facilities, library facilities etc present drawbacks in biology teaching since biology requires practical lessons in addition to every theory lessons attended per topic

Summary of the study, the conclusion and recommendations as well as some suggestion of further research were presented.
ACKNOWLEDGEMENTS

I would like to express my sincere thanks to my two advisers Dr. Francis N. Getao and Dr. Macharia, who supervised and gave assistance where it was necessary.

My gratitude also to teachers (biology) and headteachers of the two schools who gave the information required in writing of this project.

Lastly, I thank my husband who assisted me all through especially in typing the project, and encouraged me to become a professional teacher.
DEDICATION

To my husband Eston, my children Eva, Barbra and baby Horace, who suffered and bared with me when I was away undertaking this course.
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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

The Kenyan society has for a very long time held the belief that good examination performance at any level is a gateway to the next level of academic ladder. Students who do well in the Kenya certificate of secondary education (KCSE) examination stand a good chance for furthering their studies and for getting a well paying job. Education is seen or attributed to success in life and a cure to all problems of mankind. Infact, performance is purported to be the measuring yardstick for any academic entry.

An individual needs to perform well in all examinations to be considered suitable in enhancing national development particularly good performance in KCSE. One area where individuals potentiality can be utilized to contribute positively to national development is through the study of biology. Likewise, good performance of biology is of paramount important as is any other science subjects. This is because inorder for students to qualify to be selected in challenging vacancies such as fields in agriculture, medicine, forestry etc all enquire good
performance in biology among other science subjects. National exams are used as an assessment tools whereby both impressionistic and psychometric descions are based on results. In order for any individual to prosper in the fields listed above good biology performance is a criteria used to select those worthy positions in training colleges.

Previously, in the 7-4-3-2 system, the KCSE graduates who obtained first and second division opportunities were still open in high schools, teacher training colleges especially if one had performed well in science subjects, biology included. Those who were to join A-level required to have at least a credit in science subjects and at least principal in biology inorder for them to proceed with biology in higher education such as university. Good performance in biology was noted countrywide in a research carried by Eshiwani on; factors influencing academic performance where he dealt with mathematics, physic, chemistry and biology in A-level. Biology seemed to be performed well probably because schools who offered it in A-level had better equipped resources and those who were selected to do biology were willing students who have chosen it as one of their three subjects taken in A-level, than is the case today in the 8-4-4 system where biology is compulsory for all the candidates.
Many researchers have carried out studies relating poor performance of biology with a number of factors such as poor teaching methods, changes in biology curriculum, lack of qualified teachers, lack of adequate participation in theory and practical lessons etc. The study carried out focused attention on provision of resources in biology teaching and physical facilities in a school in relation to performance in biology KCSE results in the 8-4-4 system.

1.2 STATEMENT OF THE PROBLEM

Teaching biology at secondary school level should be both theoretical and practical to acquire good performance in a school generally. The theoretical part require textbooks, reference materials such as magazines, journals, in addition to teachers notes for the effective teaching. Practical part requires basic laboratory facilities among other vital items.

It appears that in the Kenyan schools; 8-4-4 system requires provision of resources especially for practical subjects, biology being one of them. These presents an alarming problem cause parents are the sole provider of these resources and at most cause parents wants to see their children performing well in national exams. The teaching of science is experiencing problems such as lack
of teachers, and those that are present lack initiative and prefer to look for other paying fields, lack of resources and enough teaching materials among others. The study undertaken aimed at identifying whether the provision of resources and facilities has a relationship in performance in biology national exam (KCSE).

1.3 SIGNIFICANCE OF THE STUDY

The study dealt with resources and physical facilities present in two schools and relating them with the school performance in the KSCE exam. Although topic on performance has been dealt with by many researchers in different areas within the country, none has specifically focused on resources alone and again on this particular area.

More to it, the educationists, teachers politicians and parents in Kiambu district have over the years shown great concern over the dismal overall academic achievement by their secondary schools students. The concerned has been verbal. The study may help in showing the importance of provision of the resources in biology teaching, alert the inspectorate group in the area to be keen on supervision to curb the habit common in some schools, who provide resources for biology only during
exam and be used as reference by future researchers working on overall subjects.

These research findings can be used by biology teachers, headteachers and curriculum maintenance to know or recognise the significance of providing resources and facilities in biology and other science subjects. This induces and motivates creative evaluation of the resources relevant to biology learning and how they can be improvised in case of limited funds to buy some of the essential apparatus used in biology teaching.

1.4 RESEARCH QUESTIONS

The study was concerned with finding out whether the provision of resources in any biology teaching in secondary school had any effect on the performance in KSCE using two schools in Kikuyu division of Kiambu district; Uthiru high and Muguga Wa Gatonye. Some of the questions the study tried to answers are;

(a) Are resources such as textbooks, library, laboratories, lights, water supply and other facilitaties such as school-bus etc have any effect in biology teaching; hence its performance
(b) How does the inadequacy or adequacy of the available resources affect the biology teaching and any repercussions reflected in effect in its performance.

1.5 OBJECTIVES/HYPOTHESIS

This study focused on achieving two major objectives namely to examine the facilities available for two schools under study and relate them to the schools biology performance. Secondly, to make recommendations for improving teaching in secondary schools as far as biology is concerned. The above study was guided by the following hypothesis;

(a) Schools with adequate resources in biology are bound to do better than those with inadequate resources.

(b) That the conditions of library, the laboratories and textbook availability determines how well the teaching of biology is accomplished, hence good results.

1.6 ASSUMPTIONS

The study worked on the following assumptions;

(a) That resources availability were the only factors that influence the biology performance of a school.
(b) That other factors such as qualifications of teachers, home background, students' attitude towards biology etc were all held at constant for the two schools under study.

1.7 LIMITATIONS

(a) Time constraints

The study covers the 1989-1995 KCSE progressive results of only two schools out of the over twenty schools of Kikuyu division. This definitely cannot be representative of the whole division therefore this study on its own cannot be used to judge in total the overall performance of all the schools in the country. Data was collected in May and June when the researcher was still teaching and very little time to travel to various schools was available. Hence two schools included in the study.

(b) Money constraint

Data was collected through observation mostly and the researcher visited the two schools for data collection. Personally, the researcher visited the laboratory with a check list ticking what was available and indicating what was not present. Travelling to these schools severally
was not possible because of money especially because the researcher relied on her own funds which are meagre. However, the researcher also was interested with record books especially concerning what resources were available in the two schools for the period 1989-95.

1.8 DEFINITION OF TERMS

(a) Facilitaties and resources
These includes all the possible quality items that would assist a biology teacher in the teaching of both practical and theory lessons of biology. This ranges from laboratory, equipments and apparatus (their number and relevance in relation to the students), the chemicals availabilities and money to upkeep or cater for all the experiments done, the textbooks types that are present both for students and reference books manuals, models, charts, photographs, motion, pictures etc

(b) National exams
This refers to Kenya Certificate of Secondary Education (KCSE). External examination done at the end of secondary education, after form four KCPE- Kenya Certificate of Primary Education exam done at the end of primary education.

(c) Antibiotics
These are drugs that are used to kill disease causing bacteria

(d) Vaccine
Substance injected into the bloodstream, used to protect persons from a disease by causing them to have a slight, but not dangerous, form of disease.

(e) Hybrids
Normally results from crossing of one variety with another of the same species.

(f) Good performance
This refers to that performance after form four examination which is desirable for entry in either a training or proceed to higher education (greater than or equal to grade D+) for the study.

(g) Kenya Institute of Education (KIE)
A Section of the Ministry of Education which deals with schools and colleges curriculum, prepare teaching and learning materials
2.0 LITERATURE REVIEW

2.1 INTRODUCTION

One of the main objectives of the 8-4-4- system is to help in reducing the problem of unemployment and produce graduates who are self-reliant in addition to promoting acquirement of knowledge for wages employment, vocational skill, technical skills etc. Lack of facilitaties has prohibited this achievements especially in science subjects biology being one of them. More stress has been laid on biology in this study probably cause of the following.

Importance of biology to Kenya as a Nation

(a) Medical fields

The field of biology deals with the study of living things and how they relate with each other and with their environment. For instance in the area of medicine, knowledge in biology has been used and continues to be used for curative and preventive purposes. Curative medicine include drugs that are used to cure disease (use of antibiotics) and preventive are like vaccine where a
necessary measure to prevent the onset and spread of disease eg immunization.

To enter into the field of medicine, good performance especially biology is vital may it be nursing, medical training colleges or to qualify to join Faculty of Medicine in University. Public health education utilizes biological knowledge on identification and use of safe waste disposal, dangers of contaminated water, maintenance of personal cleanliness, identification and disposal of infected meat and effects of pollution on the environment. Blood transfusion blood grouping, skin grafting are also included in the list of medical fields where biology knowledge is greatly used.

(b) Industrial fields

In industries such as those concerned with brewing, baking, wine making and milk processing, all use biology knowledge in one way or the other.

(c) Agricultural fields

Through the study of biochemical needs of plant fertilizers have been synthesized. Use of fertilizers to increase crop and animal productivity is evident in every continent. Improvements on animal productivity with the
use of biological knowledge dealing with inheritance of hybrids eg Friesian or Sahiwal cow or varieties of drought resistant resistant crops eg Katumani composite (maize) of Machakos etc. In beekeeping industry, biological research in various kinds of pollen grains has facilitated in selection of beekeeping sites in order to maximize productivity. Biological control and biochemical study assist in crop pest and disease control.

(d) Agroforestry and Soil Conservation

Agroforestry and soils conservation measures have all utilized biological knowledge to assist in application of the best step to curb soil erosion.

(e) Population Control

To spend less resources on providing food, clothing, shelter, education etc, a country require to regulate its population through biological knowledge eg family planning.

(f) Nutrition

Regular supply of balanced diet to our bodies helps to provide the body with energy, body building capacity and protection that we need. "A healthy nation is a wealth
nation ..." so the saying goes. Biology knowledge will educate the youth and the nation at large of the importance of a balanced diet. It is therefore of great importance that the contribution of biology in all the six listed fields be given the credit it deserves.

2.2 LITERATURE RELATED TO PROBLEM CONTENT

One way of recognising biology and its great contribution to the welfare of mankind is improving its teaching in our education system. To be convince that biology teaching is effective, good performance is expected in any secondary schools so as to have vacancies open to our graduates as well as to dropouts after completion of fourth form. As pointed by Nancy Koech in the express magazine of December 1984;

"Failure to pass the national certificate of examination puts one at a crippling disadvantage. He will not esaily get employment - the country's economic system will be affected and will be seen by the community as a failure or dropout. The society will cast accusing eyes at him for wasting the meagre resources and time while in school"

Its clearly pointed out that good performance falls under all fields or avenues to a bright future. Therefore,
checking of what other researchers have come up with in relation to performance, a number of factors seem to influence performance in any given school, lack of resources being one of them as Nkinyangi (1978-79) puts it:

"Stress on examination to select and to promote pupils from one class to the other works in favour of the privileged social classes and the relative poor performance may have nothing to do with lack of cognitive ambitions. On contrary, it may merely reflect their disadvantaged conditions namely lack of resources..."

Also the opinion of other Kenyan viewers have a lot to criticise the performance in our schools as it was noted by Kibaki Daily Nation 26th March 1983 page 3 column 3:

"The grading of schools was a fiction since the so called leading schools recruited students with the best qualifications and had adequate teaching facilitaties. He said if everything was taken into an account some private and Harambee schools which completed with national schools could be among the best schools."
It is to this effect that the study was under particularly on resources used in biology teaching, their availability in a school and their effects in biology performance as one of the science subjects. This is because for a long time science subjects performance drags behind in the list as noted by Hon. J.M. Kamotho when he announced KCSE 1993 results "that the improvement of performance in many small schools in 21 out of 32 subjects namely science. But biology was far to justify this recommendation" (Daily Nation 26th Feb. 1993 col. 3 page 6).

This is of course contrary to the research which was carried out by Eshiwani (1975) on science students performance for all subjects in A-level, he found that biology was performed well generally compared to other science subjects undertaken in A-level from 1965-1974 and results were as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>52.6%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>48.7%</td>
</tr>
<tr>
<td>Maths</td>
<td>47.7%</td>
</tr>
<tr>
<td>Physics</td>
<td>39.6%</td>
</tr>
</tbody>
</table>

(Note this is countrywide)

Here the study shows that biology was the best in performance by that time. But now in the 8-4-4 system,
the trend seems to be low in most schools. No wonder the study carried by H. Muchiri noted that; "the government has channelled huge amounts of money in improvement of science education. It has created modern facilities for science teaching, installed expensive equipments and hired expatriate personnel to train its people at great cost in hope of producing its own local manpower".

It is in the above view that the 8-4-4 system, biology plus other science subjects was advocated to be a compulsory subjects in secondary schools. Although its a practical subjects, most schools do not have the resources needed to make it possible to carry out practicals as expected. As stated by Hon. J. Kamotho on 12th June 1996 when interviewed on KBC Television during a professional view programme, "that the implementation of 8-4-4 system was hate by lack of enough time to provide all the resources needed for the practical subjects in our schools...". Mr. Kaparo also added that lack of facilities in most schools in the country contributed to poor performance in the national exams especially in science subjects (Daily Nation 15th July 1996 Pg.3 Col.5).

2.3 LITERATURE RELATED TO METHODOLOGY
This shows that many researchers preferred to get data on achievements for various schools under study from the educational offices eg Divisional headquarters or from Ministry of Education eg Eshwani (1975) in his study, Science performance in A-level. But in this study, data on achievements needed for the two schools covered were collected from the headteacher’s office.

Four methods used by four different researchers were viewed. These were P.K. Muchura (1987) research on factors influencing performance. G.S. Eshiwani in his research on factors influencing performance among primary and secondary schools pupils in western province of Kenya plus his paper on science performance in A-level (1975) and finally Olesena (1986) in his research on the effects of resources on performance.

P.K. Muchura used questionnaires and observation and analysed his data by descriptive statistics mainly simple tables, frequency distribution and percentages. Eshiwani used questionnaires and personal visits to the selected schools and used analysis of tabulated data in percentage form in his research on science performance in A-level (1975). Olesena used questionnaires, interviews and visits to collect data and use descriptive statistics as well as correlation statistics in his research (1986) to find out any relationship between resources and
performance. Also a research done by S.N. Ogoma in his study of how pupils attitudes affect achievement and ability. He used correctional methods as one way of relating performance/achievements on pupils attitudes. Here Ogoma used scales to rate pupils attitudes and gave points which added up to 100% and was able to relate it with achievements with use of correlational method. Conclusion: There is still an acute shortage of teaching aid and resources of teaching biology and other science subjects throughout the country. Most schools have no proper laboratory, library, textbooks et. The subject may be in fact still being taught theoretically in most school contrary to the syllabus requirements. The repercussions, is definitely poor biology performance in the National exams. Unless the planners, parents, teachers and those concerned address, themselves to these problems and alleviate them, the outcry and crisis in science education will continue.
CHAPTER THREE

3.0 DESIGN AND METHODOLOGY OF THE STUDY

3.1 INTRODUCTION AND SAMPLE SELECTION

There are more than 20 secondary schools in Kikuyu division of Kiambu district. The schools ranges from private schools, government assisted and Harambee schools to national schools. Of these schools, only two schools, a harambee school and government aided were selected for the study representing about 10% of the total population. Within the division, there are national schools such as Alliance (Boys and Girls) that do very well and are for the past seven years found top ranking among the first top twenty schools in the national exam. otherwise, other schools perform poorly except for a few like Mary Leakey and Kirangari Secondary who out complete the remaining schools in the division. The two schools understudy were randomly selected on the bases of easy accessibility and closeness to each other which was an important factor to the researcher.

These two schools were school A Uthiru High School, a government aided school and school B Muguga Wa Gatonye, a harambee secondary school. It should be noted that nowadays the government does not offer any assistance to
the school as regards to funds. Therefore, resources available in the two schools were either provided by parents, donations from sponsors etc.

School A (Uthiru) is a big school with an approximate students population of 600. The schools is four streamed and started before independence. School B (Muguga Wa Gatonye) is more recent, small in size and single streamed with approximately 100 students.

The study population was composed of laboratory technicians (if any), Head of department (biology), biology teachers, librarian and the headteacher as the nest sample of study in the two selected schools. Students (1989-95). The information required concerned their performance in KSCE exams.

3.2 INSTRUMENTATION

The instruments involved in the study are; one set of questionnaires given to the head of biology department in the two school sampled. A check list was also made on the essential biology resources commonly used in biology resources commonly used in biology teaching. The researcher also used some information on essential biology resources from her own experience as a student in various institutions of biological studies in regard to
teaching of biology to students who sat for the same exam (KCSE) ie Kenya Institute of Education (KIE), from schools who performed well in KCSE eg Ngandu, Precious Blood secondary schools etc.

In addition, observational points as shown in appendix 2 are prepared to help the researcher in Keen observation of the resources available in the two schools. Category of resources and scales were made to assist in data collection and to be able to quantify the resources. This was important to assist in data analysis.

The scale made covered all sorts of resources considered for this study as follows;

> more than
< less than

(1) Textbooks

The essential recommended textbooks for biology teaching were taken to be Biological Sciences Book 1, 2, 3, and 4. Other reference books were taken to be any additional relevant biology textbook.
scores were given depending on the number of books present and how they are shared by the students as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Score given</th>
<th>No. of Students per copy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>no textbook present</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>more or equal to 4 students per copy</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3 students per copy</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2 students per copy</td>
</tr>
</tbody>
</table>

Between scores 0 and 1, the situation of textbooks availability in the school understudy was said to be inadequate whereas score 2 shows an average situation where the problem of textbooks was not critical. Score 3 was taken to mean that the school has plenty of textbooks adequate for biology teaching.

2 Laboratory

The same scale was prepared for evaluating the resources that were present in the laboratory as follows;

The expected resources in any biology lab for effective practical work in any school were taken to be:
Laboratory present, well equipped and guided by the following list; space available, running water, working benches, sinks, gas taps and bunsen burners, lab apparatus, lab chemicals, lab assistant etc. some were given as shown below;

<table>
<thead>
<tr>
<th>category score given</th>
<th>status of mention item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 0</td>
<td>Not present</td>
</tr>
<tr>
<td>2 1</td>
<td>present only during exam</td>
</tr>
<tr>
<td>3 2</td>
<td>present sparingly at rare occasion</td>
</tr>
<tr>
<td>4 3</td>
<td>adequately present for all the practical lesson</td>
</tr>
</tbody>
</table>

3 Other facilities

These were also scored as follows;

<table>
<thead>
<tr>
<th>Category scores</th>
<th>status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 0</td>
<td>not present</td>
</tr>
<tr>
<td>2 1</td>
<td>rarely present</td>
</tr>
<tr>
<td>3 2</td>
<td>adequately present</td>
</tr>
</tbody>
</table>
List of these facilities are; Magazines, charts, models, photographs, motion pictures, use of resource persons, past papers, practical guides, botanical gardens, aquarium, Vivarium, school museum, green house darkroom, film strip projector, radio and tape recorder.

4 Library

Scale was made on the basis of the condition of library. If a library was present, with enough relevant useful books for biology reference, with an area for study accommodating more than 75% of the students per class at any one given time, then its given highest score 3. Then if the library offers average reference biology textbooks and serves 50% of the students, then its grouped in category 3 with score 2 if it (library) is present, no reference biology textbooks and serves only 25% of the students, then its scored 1. Finally if it absent its scored 0. Also if librarian is present score 1, if absent score 0, if present and offers minimal assistance to students score 2 and score 3 if librarian is actively involved in guiding students on the use of the library.
5 Teacher availability

Scale made on the biology teacher availability as follows:

Teacher present 1
Teacher absent 0
Teacher present but workload greater than 24 2
Teacher present but workload less than or equal to 18 3

6 Other physical facilities

Scale on the list of other facilities found in school such as school bus, guidance and counselling services, human resources, entertainments activities such as clubs, sports facilities (playground and sports equipment).

These are given scores as follows:

<table>
<thead>
<tr>
<th>Score given</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not present</td>
</tr>
<tr>
<td>1</td>
<td>present</td>
</tr>
<tr>
<td>2</td>
<td>present/rarely used</td>
</tr>
<tr>
<td>3</td>
<td>present/adequately used</td>
</tr>
</tbody>
</table>

The researcher was also interested in knowing the past situation of resources availability in the two schools as
regard to the years (1989-95) of study. An interview set of questionnaires to the librarian, head of biology department, biology teachers, lab technician and headmaster were prepared as shown in appendix 3. Use of yearly book records (library) stationary in the lab, and with the head of department (biology) help to gather data on the trend of available resources in the years of study. The same scale described above was used.

The summarised records of KCSE result from the headmaster office was used to gather data on performance (progress (1989-95).

3.3 METHOD OF DATA COLLECTION

Data were collected using the following methods; questionnaire, interviews, observation and visits by researcher to the sampled schools.

(a) Questionnaires:

A set of questionnaires for the Head Of Department of biology (HOD) (biology) and biology teachers. The samples of questionnaires are attached in appendix 2. The questionnaires were short and the researcher administered to the HOD and biology teachers who filled them in presence of the researcher so that any difficulty was
easily solved. In school A (Uthiru) 4 teachers and a head of biology department responded to the questionnaires giving almost all the information required by the researcher. In school B (Muguga Wa Gatonye) only one biology teacher was present with no head of department within the school. But all the information was obtained cause the researcher happen to be teaching the very subject within the whole school. Therefore, all the problem facing the school were at her fingerprint hence the need for the study.

(b) observation and visit

In the two sampled schools, personal visits to the laboratory, library, biology store were made and records on all facilities present in the schools were taken.

(c) Interview (informal interview)

It should be noted that observations and visits alone could not yield useful information and had to be accompanied by informal interview to the lab technicians in the biology lab and librarian in the library. Also, informal interview to the headmaster of the two schools helped to gather some information especially that concerning past situation of the resources that were
available within the two schools per years of study (1989-95).

3.4 PLAN FOR THE ANALYSIS OF THE DATA

The study used correlational statistics analysis based on the total percentage scores given to quantified resources found in the two schools yearly, and the overall KCSE results in biology performance (given in percentages). Here, the total resources present was assumed to be the total scores quantified per year and this was related to the yearly performance.

Use of bar graphs helped to show clearly the trend in resources available and performance in the two school. Definite figures of the scores given to different items included in resources were not used because it was alot and wide range of items were considered. Therefore, figures were added on total scores and percentages recorded per year.
CHAPTER FOUR

4.0 DATA ANALYSIS, OBSERVATION AND DISCUSSION

4.1 INTRODUCTION

This chapter discusses the research findings as measured by the research instruments described in chapter three. The main aim of the research was to investigate the relationship between resources available for biology teaching and performance in KCSE.

The data obtained was analysed by following the steps listed below.

(a) General comments on the pupils performance in the two schools.

(b) Comments on the distribution of the resources as shown on the trend (1989-1996) for the two schools.

(c) correlating the resources available with the performance of the two schools.

Hoel (1971) say correlation is a measure of relationship between a pair of variables. Its a useful measure of strength of relationship between two variables. The
magnitude of a correlation indicates existence of a relationship depending on whether its zero, =1 or -1 (no relationship, positive and negative correlation respectively) (Kiminyo 1994).

General comment on pupil performance

Table 1. Students with grade D+ and above in Biology (%)

<table>
<thead>
<tr>
<th>School/Year</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>93</th>
<th>94</th>
<th>95</th>
</tr>
</thead>
<tbody>
<tr>
<td>School A</td>
<td>12.0</td>
<td>3.3</td>
<td>2.9</td>
<td>17.6</td>
<td>29.5</td>
<td>41.2</td>
<td>48.3</td>
</tr>
<tr>
<td>(Uthiru)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School B</td>
<td>0</td>
<td>19.2</td>
<td>23.9</td>
<td>24.6</td>
<td>3.9</td>
<td>5.8</td>
<td>9.1</td>
</tr>
<tr>
<td>(Muguga)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table above, it is notable that school A performed better than school B in 1989. But as the next three progressive years school B performed better than A with a difference of 16%, 21% and 7% respectively in 1990, 1991, 1992. Otherwise in 1993, 1994 and 1995, school A performed better by far 26%, 35.4% and 39.2% respectively.

From the informal interview with the headmasters of the two schools, they both gave reasons as to why the performance was generally poor in the first year of
That the 8-4-4-system was introduced haphazardly without giving enough time to buy the necessarily resources especially to cater for the science subjects. Otherwise in the school A, a steady improvement was noted from 1992-1995 probably because at this time the school had rectified the situation of the resources availabilities as will be seen in table 2 to below.

A drop in performance in school B in 1993 remained unexplained by the headmaster of the school concerned. He only tried to justify the situation by stating how the enrolment of the school had gone down for the last three years hence forcing the school to lower the entry points.

Table 2 Resources available in total percentage per year.

<table>
<thead>
<tr>
<th>Year/School</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>93</th>
<th>94</th>
<th>95</th>
<th>96</th>
</tr>
</thead>
<tbody>
<tr>
<td>School A</td>
<td>19.2</td>
<td>22.5</td>
<td>24.2</td>
<td>28.3</td>
<td>32.5</td>
<td>38.3</td>
<td>43.3</td>
<td>48.3</td>
</tr>
<tr>
<td>(Uthiru)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School B</td>
<td>4.2</td>
<td>5.8</td>
<td>10.0</td>
<td>12.5</td>
<td>16.7</td>
<td>19.2</td>
<td>21.7</td>
<td>20.7</td>
</tr>
<tr>
<td>(Muguga)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table two, it can be seen that there have been notable improvements in the availabilities of resources as the years progressed in the two schools. However, it
is worthy to mention that in school A, the situation of the resources available had increased by far range being approximately 29.1% compared to that of school B where the range is 17.5%. The researcher gathered from the interview that school A was better positioned than school B in terms of receiving donations in form of books, laboratory equipment, library facilities from church organisations every year who happen to be sponsors of the school.

In school B, through the trend in total percentage shows an increase in resources present in the school per year, information from school records shows the record of some facilities yet were not available in school. Further interview to the headmaster of the school reviews that some items were stolen due to careless book-keeping by the store man. From the head of department (Biology) record shows that in school A, there has been clear and organised way of using the available resources in the department, use of join evaluation system and discussion on how to improvise lacking resources, compared to school B where no central organised assessment system existed.

To bring the picture clear of the resources available and performance, the researcher used bar graphs for both resources and performance in the two schools.
From Figure 1.1 and 1.2, it can be clearly noted that apart from year 1990 and 1991, the other years portrays an increase or improvement in performance as the availability of resources situation improved in school A. From Figure 2.1 and 2.2, it is notable that the resources available in school B showed a steady increase as years progressed from 1989 to 1995. However, performance showed a different trend for it was higher in years 1990, 1991, and 1992 followed by a sudden drop of about 10.7% in 1993. Other factors apart from resources availability may have caused this drop in performance. These includes students attitudes towards the subjects (negative and belief that the subject is hard cause its science subject), home background, administration among other factors which can be sorted out in another future research.

Correlating the resources available with the performance of the two schools

Using Spearman correlation

(a) School A.

X= Resources
Y= Performance
Table 3.

<table>
<thead>
<tr>
<th>Year</th>
<th>X</th>
<th>Y</th>
<th>RX</th>
<th>RY</th>
<th>D</th>
<th>D2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>19.2</td>
<td>12.0</td>
<td>7.0</td>
<td>5.0</td>
<td>2.0</td>
<td>4.0</td>
</tr>
<tr>
<td>1990</td>
<td>22.5</td>
<td>3.3</td>
<td>6.0</td>
<td>6.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1991</td>
<td>24.2</td>
<td>2.9</td>
<td>5.0</td>
<td>7.0</td>
<td>2.0</td>
<td>4.0</td>
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<tr>
<td>1992</td>
<td>28.3</td>
<td>17.6</td>
<td>4.0</td>
<td>4.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1993</td>
<td>32.3</td>
<td>29.5</td>
<td>3.0</td>
<td>3.0</td>
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<td>0.0</td>
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<tr>
<td>1994</td>
<td>38.3</td>
<td>41.2</td>
<td>2.0</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1995</td>
<td>43.3</td>
<td>48.3</td>
<td>1.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

$\Sigma D2 = 8$

$$R_{XY} = 1 - \frac{6\Sigma D2}{N(N^2 - 1)}$$

$R_{XY} = 0.86$

Where $r_{xy}$ = Spearman correlation coefficient

$6$ = a constant always used in this formula

$D2$ = The difference between each year's performance/resources ranks squared.
\[ \Sigma = \text{sum total of} \]

(Formular obtained from introduction to Education statistics, Pg.57).

From the above calculation, it can be noted that there is a positive relationship between resources available and the performance in biology of school A. The coefficient of 0.86 indicates quite strong relationship but not a perfect relationship. This is so because the lowest performance 12.0% (1989) does not correspond to the lowest percentage in resources 12.0%. These are ranked differently 7 and 5 respectively. It's also noted in the year 1991 that the ranking is 5 and 7 \((x,y)\) which does not show a high correlation between the two variables. Otherwise if every increase in resources (%) in school A correspond to an increase in performance, then it can be termed as a high correlation which is a positive perfect relationship.

(b) School B

\[ X = \text{Resources} \]

\[ Y = \text{Performance} \]
Table 4

<table>
<thead>
<tr>
<th>Year</th>
<th>X</th>
<th>Y</th>
<th>RX</th>
<th>RY</th>
<th>D</th>
<th>D2</th>
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</thead>
<tbody>
<tr>
<td>1989</td>
<td>4.2</td>
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<td>1990</td>
<td>5.8</td>
<td>19.3</td>
<td>6.0</td>
<td>3.0</td>
<td>3.0</td>
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<tr>
<td>1991</td>
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<td>23.9</td>
<td>5.0</td>
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<td>9.0</td>
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<td>1992</td>
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<td>1.0</td>
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<tr>
<td>1993</td>
<td>16.7</td>
<td>3.9</td>
<td>3.0</td>
<td>6.0</td>
<td>-3.0</td>
<td>9.0</td>
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<tr>
<td>1994</td>
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<td>5.8</td>
<td>2.0</td>
<td>5.0</td>
<td>-3.0</td>
<td>9.0</td>
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<tr>
<td>1995</td>
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<td>1.0</td>
<td>9.1</td>
<td>4.0</td>
<td>-3.0</td>
<td>9.0</td>
</tr>
</tbody>
</table>

ΣD² = 54

\[ R_{XY} = 1 - \frac{6(54)}{7(49-1)} \]

= 0.04

A correlation (measure of magnitude of the relationship between two variables) of 0.04 indicates a very weak relationship between performance in biology and resources availabilities in school B. A look at the two ranks shows that the relationship is somewhat random. For instance in year 1989 resources and performance ranked 7 but all the
other years, the ranking is different for example year 1992 X,Y ranked 4 and 1 respectively.

The implication of the about magnitude as far as relationship of performance and resources in school B is concerned, is that there are other factors apart from resources availabilities that seem to influence biology performance in school B. This calls for further research to investigate these factors, probably with a larger sample size.

Apart from using the percentage figures in resources, the researcher used the means of central tendency measure to gauge the situation of resources available in the two schools in responses to the information obtained through questionnaires and interviews. For instance, the textbooks availability in school A shows that there are average where about three students share one textbook but in school B, more than four students share one textbook (from question 1).

Checking on the laboratory conditions, school A had more than average in regards to expected lab facilities (apparatus, chemicals, lab assistance etc) compared to school B which had below average. From information gathered, school A carries weekly practicals in biology with no problem in chemical supply or lack of apparatus
or specimen, and easy assistance from the lab technician available. In school B, practicals are done only during major exams namely district mocks and the KCSE exams. Reasons being lack of chemicals, enough apparatus or specimen to carry out practicals weekly as recommended by the syllabus (biology). Also, the biology teacher finds it hard to prepare and improvise resources not available since the school lacks a lab technician. Funds allocated to the laboratory is minimal, therefore limits practicals that are undertaken. This affects the students final performance for they are faced with difficulties in handling some of the apparatus for the first time in the exam (response to questions 1, 2, 3, 4 and 5).

In response to question 6, it's clearly seen that in school A, there is an organised system of evaluation or assessing biology students and are assessed frequently. This is followed by departmental discussions as to why the performance is poor or good. Recommendation are given where the case of performance is poor (i.e., whole school). There is also adequate provision of past papers from divisional centre and from other neighbouring schools. In school B, no frequent assessment tests, reason being sometimes due to lack of adequate typing service as a result of poor administration that fails to organise and schedule for typing services in regards to exams set. Also, poor access to past papers either from the
divisional or from the district due to negligence by the headteacher to collect or arrange for this assessment. This affects performance for the students fails to prepare themselves adequately for the exam (past papers makes the students aware of the type of questions to expect in exams and help in revision).

In response question 6, school A had more than average supply of the facilities indicated within the biology department. The four biology teachers co-operated with the lab technician, students and the headteacher in providing what was termed as essential resources either by the improvisation where the cost of buying the resources is high or the headteacher school buying the items. Lab technician assist in making of models, charts and collecting of specimen for preservation. This gives the students a chance to familiarize themselves with these items before the dawn of the exam. In school B, with only one biology teacher, no lab technician and a headteacher who hardly co-operate in buying not even simple items to supplement costly ones in class practicals, leaves the situation a pathetic one. students also are to blame for they too are not interested in the subject (majority of them prefer arts subjects). The repercussions is definitely poor performance in the subject.
Question 8, 12 and 13 reviews that in school A, students are actively involved in clubs like science congress which helps allot especially in developing skills that assist the students in improvisation of some resources in the laboratory. The club also motivates students to be creative and participate in biological field trips and field study as well as setting projects in their botanical gardens. This assists the students to be actively involved in relating what is learnt and their environment, an important examinable fact especially in Ecological studies. Also, other clubs like drama, music festival etc are above average in school A where students even reach national level countrywide as is the case with sports. All these have a role to play in the minds of students. Where students are actively involved, they hardly get time to think of evils such as drug abuse, seeking, strikes etc and this has a positive effect on their performance.

On the other hand, in school B science congress does not exist and entertainments clubs are below average. Students do not participate in almost all the clubs listed in school signboards namely drama, music festival, wildlife, young farmers etc. The teachers are to blame cause those who are assigned to be patrons of these clubs do not motivate students so as to attend the weekly meeting held every Wednesday. They give lame excuses of
lack of time since it's a day school, club time allocated after class when most teachers are in a hurry to go home. Also to blame is the headteacher who fails to allocate funds to these clubs such that in case of trips to be attended, students will not be discouraged to join clubs due to failure to reach the expected place cause of money eg to pay for transport, especially cause school lacks a school bus.

As for games, both school A and B are very active and they participate even beyond divisional level. This is important cause students are able to utilise their psychomotor skills and excel in extracurricula activities which may help improving performance generally. Question 10 gives information on the library condition and it shows that school A is better positioned infact above average in provision of the necessary relevant biology reference in the library than school B which is below average. School A's library has enough room for study for at least 75% of the total students per class and a librarian to guide them on the available books. This offer a conducive environment for study bound to result to good performance.

School B has below average situation as far as library condition is concerned. The library is small (can accommodate only 20 students per time) about 40% of the
total students and its characterised by a stock of very old outdated books that were donated by a church organisation back in 1993. As a result, very few on none at all make use of the library. Some even come out of school after fourth form and are surprised to hear the deputy teacher inquiring about library clearance. Definitely, this affects their performance knowing that a teacher nowadays is a facilitator and covers only 10% of what is supposed to be learnt leaving 90% for the students to be covered individually best place being a school library.

Question 9 and 11(b) gives the implication that school A invites or uses human resources for some topics covered in biology syllabus eg human population, pollution etc. This is done occasionally and it gives the students a chance to exchange and gain different views from a research person rather than the usual biology teacher. Guidance and counselling services are adequately taken care of with a qualified teacher in guidance and counselling and necessary facilities such as well established room wholly meant for the above named services. Students utilises this unit well and the teacher happens to be very social, understanding and patient with the students who presented problems. As such, she encourages the students to feel free, relaxed and this helps in keeping the school in harmony. She
helps to prepare the candidates psychologically by making them ready for the exam, to feel relaxed and reduce anxiety. This helps the students to face the exam with courage and may contribute to better performance.

In school B, guidance and counselling services and use of human resources is minimal or none at all. As such students experience exam fever, lack of concentration and sometimes students are told to go home immediately they sit for a paper cause they cannot be controlled in school. They usually appear tensed and release this tension by making a lot of noise which disturbs those who may want to study thus affecting their performance.
5.0 SUMMARY, CONCLUSION, AND RECOMMENDATION

5.1 INTRODUCTION

To conclude this study, a brief summary is necessary and a conclusion of the study. Recommendation are also given which can be used for improvements of biology performance in regards to resources available in all kenyan secondary schools. This can also be applied to other science subjects.

5.2 SUMMARY

This study was set to investigate whether the provision of resources and facilities has a relationship in biology performance in two selected schools in Kikuyu division. These schools were Uthiru High school and Muguga Wa Gatonye secondary schools of Kikuyu Division. Lack of resources in both secondary and primary schools was found to be a common phenomena in most Kenya schools. In the two schools studied, the case was found to be true though the degree of scarcity of the resources differed in the two schools. It was found that the resources found in any school can be grouped into various items namely;
(a) Textbooks

The biological science KIE were taken to be the essential textbooks suitable for teaching biology. The case in school A showed that an average of three students share one textbook. Meaning there is still room for improvements for effective use of the textbook by every student. However in school B, the condition seem to be critical and the teacher is required to do 90% of the work for the student in form of summary notes for the textbook is scarcely distributed in class.

(b) Laboratory condition

Running water, available sinks, space, benches are all essential for a smooth practical class. The number of apparatus and available chemicals determines the number of students per group working in an experiment. Also it gives the teacher a chance to interact with every member if the working group is small. A lab assistant help is ease arrangement of a practical hence quick understanding. IN school A, this was found to be so as compared to school B where all the work is done by biology teacher.

(c) Library
Reference books relevant to biology are essential in assisting both the teacher and the students for effective learning. This helps to enrich the sources of biological information thus better understanding of the subjects. School A seemed to meet this condition to some extent compared to school B where the situation is pathetic one.

(d) Availability of biology teachers

Availability of biology teachers in a school as a resource is of great importance. They should be qualified, devoted to their work for better performance. Their number also matters in that the smaller the ratio between students and the teachers, the better for it encourages interaction hence adequate assistance to students. In school A, there were four teachers with workload, of less than 18 lessons per week. This was apposite in school B with one biology teacher and this was found to affect effectiveness in teaching biology, hence its performance.

(e) Other facilities

Other facilities like a school bus, sport facilities etc seem to play a great role in keeping the students busy. This helps in reducing indispline cases and has a positive effect on the performance of the school.
Presence of a school bus eases transport problems hence to participate in sports, field study is much easier in a school. Finally, guidance and counselling services and well as use of human resources best utilised in school A contrary to the situation in school B.

5.3 CONCLUSION

The study set out with the objective of finding out whether there is a relationship between resources availabilities in a school and biology performance in KCSE. This objective was fulfilled partly by the end of the study in that there existed a relationship between resources provision and good performance in biology in school A. This was proved by the magnitude calculated (correlation coefficient of 0.86) which show a strong relationship between the two variables. However, in school B, the magnitude was too low 0.04 which showed a very weak relationship. Therefore, it cannot be concluded that the objective was fully attained. Probably, the sample size used of the two schools was not enough for an overall conclusion.

The first hypothesis was found to be partly true because it was found that the increase of resources per year
showed a corresponding improvement in performance (biology) in school A. However, in school B, increase in resources yearly does not correspond to increase in performance. This implies there might be other factors influencing performance in biology. Also, the sample size understudy was small (two schools).

The second hypothesis was not proved because although there was analysis of the conditions of the library, laboratory and textbooks in the two schools, it was hard to correlate them with the teaching of biology and KCSE biology results. Further research is recommended to prove this hypothesis true, with a larger sample size ie more than two schools.

5.4 RECOMMENDATIONS

According to the findings and conclusions of this study, the researcher suggests the following recommendations in order to improve performance in biology as far as resources for effective teaching is concerned.

1. With the establishment of 8-4-4 system of education in Kenya, much emphasis has been made on subjects which require practical work. Science is one of the subjects which are effectively learned by doing rather than listening. It should be stressed that
resources for biology teaching are essential for good biology performance.

2. There is need for more interaction between students, teacher and parents as well as the headteacher for improvisation and provision of resources for biology teaching in any school.

3. Special funds should be allocated in every annual budget of a given school to equip the laboratory and buying of other facilities to make it possible for the subject to be more practical than wholly theoretical.

4. The ministry of Education should have more inspectors for all secondary schools to ensure that essential resources such as laboratory chemicals and apparatus are not only provided during the exam (a common phenomena in most schools) but all through the learning of the subjects whenever a practical need to be carried out.

5. The KIE to evaluate biology syllabus with an intention of setting practicals for topics that will require minimal resources yet the practicals to be effective.
6. It should be stressed in all the training colleges the importance of providing resources for biology and other practical subjects for better performance. Thus the trainees are made aware of this importance. They should be given guidelines and ways of the improvisation of some resources that might be insufficient or too expensive to buy.

7. Donors, sponsors, charitable organisation and well wishers should be urged or approached to assist in funding some schools so as to provide resources, eg donation in term of library textbooks, biology reference books etc.

8. Harambee should be organised to generate money where the biology resources are scarce to equip the library, laboratory etc.

9. Intensive guiding and conselling should be done on the parents and students to educate them on the advantages of good education. Once they realise this, they might help the school to curb cases of insufficient resources.
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4. Eshiwani, RESEARCH paper on Science performance in A-level.


7. Ministry of Education; Biological sciences syllabus for Kenya certificate.

9. Ministry of Education; 8-4-4- system of Education, Government printers, Nairobi 1984


12. Nkinyangi; OPC Page 32


14. Citations from the Daily Nation


Appendix 1

QUESTIONNAIRE

HEAD OF BIOLOGY DEPARTMENT

School Name..........................................................

2. (a) Do you have enough biology related materials?

Teacher’s name..................................................

Teaching subjects in addition to biology...................

1 (a) Are there enough textbooks for biology in your school. If so, indicate how many copies issued to students per class in Form 1, 2, 3, 4.

<table>
<thead>
<tr>
<th>Biological Sciences</th>
<th>No of textbooks</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Give any other reference biology text books if present
(c) Are there practical manuals: Yes... No... (tick where applicable)

2. (a) Do you have a laboratory in your school?
Yes... No... If yes

(b) How often do you use this lab for biology practicals:

Once a week .................
Once a month .................
Only during the exam.......... (tick where applicable)

3. (a) Are there enough lab apparatus for at least biology practicals undertaken per topic. Yes..., No...

(b) If the answer above is yes, indicate whether they are:

Adequately present.........................
Present sparingly.........................
Absent but present during exam ............
(tick where applicable)

4. (a) How are chemicals supplied in the lab?

Always present for all practicals.
Present on rare occasion.
During the exam only.

(b) Do you have a lab assistant? Yes., No.

5. (a) Do you have preserved specimen for use in biology?

Yes., No.

(b) If yes, how do you obtain the specimens?

Biology teacher provides.
Lab assistant.
School buys.

(tick applicable)

6. How often do you use past papers to assess students?

Once a month.
End term.
Not used.

Do you use joint assessment in the biology department?

7. Tick whether you have the following teaching resources in your school and are used in biology teaching.

Charts Yes...No....
Models  Yes....No....
Photographs  Yes....No....
Motion pictures  Yes....No....
Film strip projector  Yes....No....
Tape recorder  Yes....No....
Radio  Yes....No....

8. Is there a science congress club in your school?  
Yes....No....
If yes, how do the members fair in participation during parent's day or any other day when the present their work.  
Good......................
Fairly......................
Poorly......................
(tick where applicable)

9. How many times in the past 2 years have you consulted any person for human resources to help in relevant topics such as soil erosion, human population etc?  
..................................................................................
..................................................................................
..................................................................................
..................................................................................

10.(a) Is there a library in your school? Yes....No....
If yes, how active:

Very active......................................................

Weak..........................................................

Not active....................................................

13. Are there sports facilities in your school?
Yes....No....

If yes, how far do your students fair in games at the annual competition within the division?

Locational level.............................................

Divisional level.............................................

Do not participate.........................................
Appendix 2

OBSERVATIONAL POINTS BY THE RESEARCHER

1. View the laboratory and the library. Observe the condition of the two i.e. space available e.g. in the lab, is there enough space for the students to perform their practicals fairly without overcrowding (how many students per group/bench in any given class). If it's the library, is there enough reading space?

Observe the condition of apparatus and equipments present.

2. Is there any lab assistant?

3. Nature of the chemicals in the lab. Are they expired, very few etc.

4. Is there a veranda, outside the lab? Is there electricity, water etc.

5. Is there a biological garden in the school?

6. Check list (Carried and ticked if present)

Botanical garden
Vivarium
Green house
Darkroom
Magazines
Relevant charts
Models
Photographs
Appendix 3

GUIDE LINES FOR INTERVIEW

1. Biology teacher

Please help me to indicate the trend of textbooks for the last seven years.
(From the book records, the teacher is supposed to give the following:

<table>
<thead>
<tr>
<th>Biological Sciences KIE's</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>93</th>
<th>94</th>
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<td>BK2</td>
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<td>BK3</td>
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<td>Practical Manuals</td>
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<tr>
<td>Other reference books</td>
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<td>Total students</td>
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</table>

2. Lab technician
For how long have you worked in this school as a lab technician?

Less than two years

More than two years

Greater than two years

From your own experience in this school and from records of the lab stationary on resources present, help me to record the trend of the items for the last seven years.

<table>
<thead>
<tr>
<th>Items</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>93</th>
<th>94</th>
<th>95</th>
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<tbody>
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<td>Lab present</td>
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<tr>
<td>Lab space adequate</td>
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<tr>
<td>Water, working benches sinks etc present</td>
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<td>Lab apparatus</td>
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<tr>
<td>Practical manuals</td>
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<tr>
<td>Darkroom</td>
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<tr>
<td>Lab assistant</td>
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</tr>
</tbody>
</table>

3. Other teaching facilities.
From head of biology department and her records of items present in the department and her records of the items present in the department. For the time you have been here and from your records, please help me to indicate the trends of the following items used in biology in your school.

<table>
<thead>
<tr>
<th>Items</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>93</th>
<th>94</th>
<th>95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magazines</td>
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<td>Motion pictures</td>
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<td>Green house</td>
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<tr>
<td>Film strip projector</td>
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<tr>
<td>Tape recorder/radio</td>
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</tbody>
</table>
4. Library condition

From the librarian

Please indicate how long you have worked in this school

- Less than two years
- Greater than three years
- Less than five years

Using your experience in the time you have worked in the library of your school, and records of the books received in the library yearly, help me to indicate the trends of the following items.

<table>
<thead>
<tr>
<th>Items</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>92</th>
<th>94</th>
<th>95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library condition</td>
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<tr>
<td>Librarian</td>
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<tr>
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<tr>
<td>Reference books relevant to biology</td>
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</tbody>
</table>

5. Headteacher
For how long have you worked in this school as a headmaster?

- Less than two years
- Greater than three years
- More than five years

From your own experience and school records of physical facilities present in this school, please help me to record the trend of items for the last seven years.

<table>
<thead>
<tr>
<th>Items</th>
<th>89</th>
<th>90</th>
<th>91</th>
<th>92</th>
<th>93</th>
<th>94</th>
<th>95</th>
</tr>
</thead>
<tbody>
<tr>
<td>School bus</td>
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<td>Guidance and counselling services</td>
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<tr>
<td>Entertainments</td>
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<td>Club activities</td>
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<tr>
<td>Biology teachers</td>
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<tr>
<td>Use of human resources</td>
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</tr>
</tbody>
</table>