

PROBLEMS OF UTILIZING BASIC BIOLOGY LABORATORY EQUIPMENT IN SENIOR SECONDARY SCHOOLS IN KANO MUNICIPAL LOCAL GOVERNMENT, KANO STATE

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Abstract

A survey which attempted to X-ray the problems of utilizing basic Biology laboratory equipment in Senior Secondary Schools in Kano Municipal Local Government Area was undertaken using personal contact, direct laboratory facilities examination and with the help of a standard questionnaire. Although there were 80% trained Biology teachers, their number was not enough to cover the over populated Biology classes. An observed problem of poor exposure to Biology practical lesson existed, in all the schools except in one science secondary school. However, the SS3 classes claimed that they were exposed to practical lessons during which they became aware of the laboratory equipments but hardly utilize them, 60% of the schools have only one functional Biology laboratory but the remaining 40% had none. The dilapidating condition of the laboratories (obsolete and/or broken) was a barrier towards effective learning of Biology. Lack of well-trained laboratory technicians and assistants exerted another impediment in the smooth running of the laboratories. Poor concern by the government was the major complaint. Education officials and the principals maintained that, the problem of high cost, management as well as the erratic water and electricity supplies were part of the hydra headed factors implicated. Perhaps, these problems were partly responsible for poor performance of students in Biology.

Keywords: Biology, Laboratory, Equipment Utilization, Problems.

Introduction

Biology is a natural science of living things which is philosophically known to be one of the most central subject areas in the educational curriculum that prepares and develops learners' cognitive, affective and psychomotor domains (Green, Stout and Tayler *et al.*, 1995). It is one of the basic sciences whose teaching and learning are universally known to be efficient and successful' if only they are undertaken simultaneously with the help of adequate instructional materials and facilities. Abdullahi (1995) explained that, adequate laboratory demonstration and/or field practice facilitate the learning of Biology.

Inomesia (1997) maintained that Biology is taught and learned through systematic experimentation, observation and testing that is by no means possible theoretically alone.

The unique venue, place, field or room suitably equipped with tools, apparatus, specimens, samples, gadgets, models, reagents and other instructional media, generally makes a laboratory. Egwuyenga (1998) stated that learners are expected to acquire useful science based knowledge, good analytical measurements, testing skills, experimental and team - based learning as well as critical thinking in a good laboratory. It is also a special place for developmental researches towards better human technological and/or industrial development (Olunloyo, 1997). Its equipment are indispensable for Biology teaching and learning process.

The Kano State government since 1977 has become well committed to promoting the teaching and learning of science subjects in its secondary schools. As the result, laboratory facilities and equipments as well as personnel were provided. In addition, special science secondary schools were established (K.E.R.D, 2000). To our dismay however speculations are being shared that the performance of students in basic sciences including Biology since 1988 was declining (Abdullahi, 1995). Who was responsible for the problem - the government, teachers or students is what the present study wanted to sort out.

Objectives of the Study

1. The present study was set to: Carry out an investigation on the quality and quantity of the Biology teachers in the senior secondary schools situated around Kano municipal local government. This is with a view to ascertaining their capacity and capability of utilizing the laboratory equipments necessary for teaching and learning of Biology effectively.

2. Find out if the Biology laboratory and field facilities, equipment and reagents are made available and in a proper working conditions in those schools.
3. Find out or assess the teachers' ability to improvise the unavailable or obsolete basic Biology equipment where necessary.
4. Proffer some solutions that would help improve the standard of teaching and learning of Biology in senior secondary schools as it involves the use of laboratory equipments.

Significance of the Study

The study would provide an update on the Biology laboratory teaching and learning facilities as well as the quantity and quality of Biology teachers in Kano Municipal. This would be useful in educational planning and administration.

Research Methodology

Survey research technique was employed to explore, explain and describe the nature of existing conditions of Biology laboratory equipment and their utilization in secondary schools in Kano municipal. This was authenticated by the explanation of Cohen and Manion (1994) as well as Babbie (1986).

Population for the Study

Nine existing government senior secondary schools of Kano municipal local government area served as the source for the samples of the present study.

Sample for the Study

'Quota sampling' as described by Bichi (1997) allowed the selection of five schools in this study area. Two of the schools were for boys - that is Rum fa College and Government Secondary School, Sharada. The third one is Science Secondary School, Kano for boys. The fourth school was Girls Science and Technical College, while the fifth was Government Girls Secondary School, Shekara. The selection was non-gender bias and non probabilistic as to allow a somewhat stratification of samples that enabled the selection of the schools to span longitudinally and widely across the local government area.

A total of Fifteen Biology teachers, three from each school were respectively interviewed and sened with the research questionnaires. Thirty (30) student respondents were randomly chosen in the following manner: 10 students each from SSI, II and III from each school respectively. This gives a total student sample of 1 50 that served as respondents for the study. Two official inspectors of Biology at Kano Educational Resource Department (K.E.R.D) were interviewed for more information on Biological sciences education in the schools.

Data Collection Instrument

The main instrument for this survey is a self developed questionnaire, personal interview and direct examination or observation of the basic Biology laboratory equipment in the school. The face validity of the instruments was determined through experts rating in the Department of Education, Bayero University, Kano.

The outline of the specimen questionnaire is of two forms (Appendix I and II). Appendix 1 is the questionnaire for both the Biology teachers and the principal and contained 20 items, There was no need for constructing separate questionnaire for the principal and teachers as the items were the same. Items 1 - 4 asked about the personal data and working experience, items 5 to 9 asked about the availability of the laboratory facilities in the school. Items 10 to 20 dwelled more on digging out the detail of the problems of utilizing basic Biology equipment and the means of ameliorating the problems for an effective Biology teaching and learning process in Kano municipal senior secondary schools as at year 2000/2001. Appendix II is a specimen questionnaire specifically for students in senior secondary clas= SSI, SSII and SSIII who offered Biology in the schools studied. It has 16 items tagged a - p). Items a and b were for persona! data of the students. C -j centered on the students exposure to Biology lessons and laboratory practicals. Availability of a functional and well equipped Biology laboratory as well as the. attitudes of teachers towards effective utilization of these facilities were monitored, Items k to -p were set to find out evidences from the students of the educational management effort in ensuring hitch free laboratory instructions in Biology and perhaps the nature of motivation the students acquired based on the style and methods of instructions they were opened to in Biology lessons. The instruments consisted of some fill in the blank which give ample freedom of expression as well as some leading questions which requested the respondents to tick only for more objectivity.

Data Collection

Administration of the instrument was done by the researcher personally at each senior secondary school in the study area. The teachers and students of Biology and principals of each school were given the questionnaire and the

researcher tried to explain the procedure of providing information. The researcher requested the teachers as where available or the laboratory technicians or the school administration for conduction round the existing laboratories to monitor them for verification.

This process of questionnaire administration and collection after completion was accomplished for a period often days.

This system for distribution and collection of questionnaires, gave the researcher an opportunity for informal discussion with the students, teachers, and principals on the problems of utilizing basic laboratory equipment in their schools.

The data was analyzed with the help of descriptive statistics (Bichi, 1997). These include tabulation, percentage, sums and arithmetic mean of the results obtained.

Results and Discussion

Table I showed the first five schools with their teachers and students population studied out of the total of nine government secondary schools in the area. Of the four principals that responded 50% had basic sciences education skills, while among the other two, one has qualified as B. Sc Biology graduate and the other Bachelor of Arts Education (Table 2).

Out of the 15 Biology teachers served with the questionnaire, 12(80%) responded. 33% of them had leaching experience of less than five years while 67% had between 5 and 13 years (Table 3).

The extent of exposure to the Biology laboratory and its utilization at SSI, SSII and SSIII class levels are shown in Table 4-6 respectively.

Although there were a good number of well trained and experienced teachers, their number was not enough to cover such a large number of students offering Biology in each school. There was an observed problem of poor opportunity for practical work in the very few number of the limited laboratories, hence the project and discovery methods could be hampered (Oguniyi, 1996). Benches, stools, tap water and electricity were inadequate. Only 40% of the laboratories were seen with essential equipment like pooler, photometer, thermometer, microscope, hand lens, glassware, distilled water, dissection kits, permanent slides and anatomical models of plant and animals. 60% were broken, obsolete and dirty, indicating poor utilization. Teachers' attitude towards improvisation was poor. Osakwe (1998) remarked that teachers should adopt the habit of improvising for laboratory equipment that are lacking or non functional in their schools to improve teaching and learning process.

The teachers resorted to chalk - talk method in 80% of SSI and SSII classes except in one science secondary school. However, the SS3 students stated that they were exposed to practicals but hardly utilized the appropriate instructional materials. The period for practicals was not more than two hours per week. Inadequate technicians or lab assistants was also a common impediment to smooth organization and running of laboratory activities. This seemed to be a general problem as reported by Ezeawenyi (1998) in many schools in Nigeria.

Educational officials including the principals maintained that high cost and overpopulation of students were part of the many implicated factors as also noted by STAN (1998). Perhaps these were partly responsible for poor performance of students in Biology.

Conclusion and Recommendations

Basic biology laboratory equipments and their utilization in many government secondary schools in Kano municipal local government were inadequate. It could be claimed that progressive teaching and learning of biology was in jeopardy.

Therefore, it is recommendable to education authorities to ensure adequate budget and planning for better science laboratory infrastructures, fresh supplies of reagents and equipments. Employing well trained teachers, efficient supervision as well as training and retraining should be expedited to ameliorate the problems. Motivation with incentives to boost morale of teachers and Interest of students is desirable. Parents and students too should participate in this transformation through for example ensuring of general discipline. Generally, maintenance culture on science equipments should be encouraged for an overall societal development.

Table 1: Identified Government Senior Secondary Schools in Kano Municipal L.G.A. Including the Category and Enrolment of Students, Number of Biology Teachers and Biology

Laboratories as at January 2001

S/N	Name of Sch.	Student Gender	Location	N0. of Biology Teachers	Students Population offering Biology	N0. of Labs
1	Government Sec. Sch. Sharada	Boys	Sharada Bata	3	780	Multi-purpose lab (1)
2	Rumfa College	Boys	Kofar Dan' Agundi BUK Road	3	700	2
3	Govt. Sec. Sch. Shekara	Girls	Shekara by Yakasai Qtrs.	3	560	Multi-purpose lab (1)
4	Govt. Day Sci.College, Kano	Boys	Nassarawa GRA Behind Technical College	4	480	1
5	Govt. Girls Sci. and Tech. College Kano	Girls	Abdullahi Bayero Road near Kano Scholarship Board	2	163	1
6	Govt. Sec. Sch. Kofar Nassarawa	Boys	IBB Way K/Nassarawa	3	700	1
7	Govt. Tech. College Kano	Boys	Nassarawa GRA	Nil	-	-
8	Sch. for Arabic Studies (SAS), Kano	Boys	Emirs Palace Road Kofar Nassawara	Nil	-	-
9	Aliya Sch. for Islamic Studies	Boys	Shahuai near Yakasai Qtrs.	Nil	-	-

Table 2: Qualifications of Principals of the Schools Studied

Qualification	Number	Percentage (%)
B. Sc (Ed)	1	25
B. Sc + NCE	1	25
BA (Ed)	1	25
B. Sc	1	25
Total	4	100

Table 3: Number of Biology Teachers and Their Qualifications in the Schools Studied

Qualification	Number available	Number that responded	Percentage (%) respondents
B. Sc (Ed) Biology	6	6	50
B. Sc (Biology) + NCE	5	2	16.7
B. Sc Biology	4	4	33.3
Total	15	12	100

Table 4: Student Extent of Exposure to the Biology Laboratory Facilities and Its Utilization

Question No.	Response	% of students exposed	% of students
c	At least 2 periods available for biology per week	100	0
d	Exposure to practical at least once in a week	20	80
e	Availability of Biology teacher	100	0
f	Conduction of normal classroom lesson with no practicals	100	0
g	Did you observe any effort by the Biology teachers to help students with practicals?	40	60
h	Presence of a separate Biology laboratory	60	40
i	Availability of reagents and equipment	20	80
j	Do you ever notice your teacher trying to produce some of the equipment for your lab work?	40	60
k	Have you ever witnessed a new supply by the government?	20	80
l	Some of the necessary equipment that are lacking microscope, slides, animal and plants specimens, organs etc.	40	60
m	Students rating of their Biology teacher as good in trying to help them understand biology	80	20
n	- Students too many in the lab	80	20
	- No lab attendant	60	40
	- lab. benches, tap water and electricity in short supply	60	40
o	Some other worries		
	- Some teachers retrenched	80	20
	- Not enough stools	60	40
	- Laboratory too small	80	20
p	The students interest in the subject Biology	80	20

Table 5: Student Extent of Exposure to the Biology Laboratory Facilities and Its Utilization at SSII

Question NO.	Response	% of students exposed	% of students not exposed
c	At least 2 periods available for Biology per week	100	0
d	Exposure to practical at least once in a week	40	60
e	Availability of Biology teacher	100	0
f	Conduction of normal classroom lesson with no practicals	100	0
g	Did you observe any effort by the Biology teachers to help students with practicals	40	60
h	Presence of a separate Biology laboratory	60	40
i	Availability of reagents and equipment	40	60
j	Do you ever notice your teacher trying to produce some of the equipments for your lab work?	40	60
k	Have you ever witnessed a new supply by the government?	20	80
l	Some of the necessary equipment that are lacking microscope, slides, animal and plants specimens, organs etc.	60	40
m	Students rating of their Biology teacher as good in trying to help them understand Biology.	60	40
n	There are too many students in the lab. No lab attendant.	80	20
o	Not enough stools, benches, water, electricity, buildings.	60	40
	Some teachers retrenched	100	0
p	The students interest in the subject Biology.	90 (45)	10 (5)

Table 6: Student Extent of Exposure to the Biology Laboratory Facilities and Its Utilization at SSIII

Question No.	Response	% of students exposed	% of students not exposed
c	2 – 4 periods available for Biology per week	100	0
d	Exposure to practical at least once in a week	100	60
e	Availability of Biology teacher.	100	0
f	Conduction of normal classroom lesson with no practicals.	100	0
g	Did you observe any effort by the Biology teachers to help students with practicals?	100	60
h	Presence of a separate Biology laboratory.	60	40
i	Availability of reagents and equipment	40	60
j	Do you ever notice your teacher trying to produce some of the equipment for your lab work?	40	60
k	Have you ever witnessed a new supply by the government?	20	80
l	Some of the necessary equipment that are lacking microscope, slides, animal and plants specimens, organs etc.	60	40
m	Students rating of their Biology teacher as good in trying to help them understand Biology.	60	40
n	There are too many students in the lab. No lab attendant, Not enough stools, benches, water, electricity, buildings	80	20
o	Students worries		
	Had practical at SS I	20	80
	Had practical at SS II	40	60
	Retrenching of their non indigenious Biology teachers	60	40
p	The students interest in the subject Biology	80	20

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