

Academic Achievement in Biology with Suggested Solutions in Selected Secondary Schools in Kano State, Nigeria

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Abstract: The level of students' academic achievement in Biology subject was found to be very poor. The declining performance of secondary school in Kano District is somewhat disappointing. The purpose of this paper is to identify the students' academic achievements in biology subject. The sample comprises of one hundred respondents selected by using simple random sampling technique from the randomly selected five secondary schools. Data was collected by using questionnaire, documentary analysis of SSCE results for five years, observations and interviews. The statistical tools emphasized in analyzing the data were frequency table and simple percentages. However, if the government, NGOs, parents, teachers, students and other involved body can make proper implementation of the recommendations given in this paper, the level of students' academic achievement in biology will reach to its maximum standard. The researcher is urging for more researches to be conducted in other regions in order to fix the problem nationwide.

Key words: Secondary school, biology, academic achievement

Introduction

In today's climate of school accountability, it is important to investigate the level academic achievement of students. It is because of the massive failure of students in SSCE-Biology subject. Frightened by the declining in the performance of students in biological science, Individual science association such as Science Teachers Association of Nigeria (STAN) have worked tirelessly for almost two decays to deal decisively on students' academic under achievement in science by developing innovative teaching strategies that would improve learning of science.

Statement of Problems

It has been observed that poor performance in the field of science is caused by the poor quality of science teachers, overcrowded classrooms and lack of suitable and adequate science equipment among others. Students perform poorly in biology because; the biology classes are usually too large and heterogeneous in terms of ability level. Snezana et al. (2011) outlined in his study that academic achievement in lessons began with experiment or slide demonstration was higher than lessons beginning with lecture method. In addition, the laboratories are ill-equipped and the Biology syllabus is over loaded (Ajayi, 1988). This study intended to examine the students' academic achievement in biology in some selected secondary schools in Kano State.

Secondary School Education

The Federal Republic of Nigeria (1998) refers to secondary education as the education given in institutions for children aged 11 to 16 years old. It further stresses that since the tertiary education

system is built upon it, the secondary level is the key to the success or failure of the whole national educational system. In other words, the secondary education is the second tier of the 6-3-3-4 educational system which is for six years duration in Nigeria.

According to Adepoju (1998) secondary education is the type of education which is exposed to children in secondary institution, where the students acquire fundamental knowledge, skills, thought, feelings and actions, which are considered necessary for all citizens, regardless of social status, vocation or sex. It should be noted that secondary education has direct impact on development as a result of the cognitive skills of literacy.

As from 1960, the country witnessed a considerable expansion in secondary education and major re-organization. In northern Nigeria, middle schools were dissolved and sixth forms were introduced. Schools of basic and preliminary studies were also introduced. By year 1980/81, the first graduates of UPE scheme were turned out but these increased the number of candidates for secondary school. Thus facilities equipment and teaching aids were heavenly expanded to cater for the population. For example there are 161 secondary schools in 1955, 275 in 1956, 297 in 1957, 303 in 1958, 305 in 1959 and 311 in 1960. Immediately after independence, the various regional governments addressed this issue by establishing more secondary schools. Thus, some of two decades after independence, the figures of secondary schools in the country had risen to 1928 in 1977/78, 2,249 in 1978/79, 2,778 in 1979/80 (Osokoya, 1989). The sharp rise in the figures is the result following by in adequate and in proper planning. This oversight is by the large one of the major contributing factors to the still ensuring deterioration in quality and efficiency of secondary education delivery.

Purpose of Secondary School Education

The secondary education in Nigeria, which is the pivot of the entire educational system in fast losing relevance as it is not fulfilling the national objectives set down in the National Policy on Education. The National Policy on Education (NPE, 1998) spells out the broad goals of secondary education on being prepared to the individual for;

- (a) Useful living within the society, and
- (b) Higher education.

In order to achieve these goals, the documents further states that secondary education shall:

- (i) Give the child opportunities for developing manipulative skills and will enable him to function effectively in the society within the limits of his capacity.
- (ii) Inspire its students with a desire for self-improvement and achievement of excellence.
- (iii) Give citizenship education as a basis for effective participation in the contribution to the life of society.
- (iv) Foster national unity with an emphasis on the common ties that unite us in our diversity
- (v) Offer diversified curriculum to cater for the differences in talents, opportunities and future rules.
- (vi) Provide technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development.

The above laudable aims and objectives are more mirage today. The products of today's secondary system can neither usefully live in society nor move into higher institution without their portal aids or forgery. They cannot think for themselves or respect the views and feelings of others. They love no iota of dignity for labor except for things that will give them quick money. The astronomical increase in the population of these non-useful secondary school products is posing a great moral and social threat to the society.

Secondary Schools Curriculum

When the country returned to civilian rule in October 1979, then new government reviewed the 1979 white paper and issued a revised edition of the National Policy on Education in 1981. The major changes in secondary education was the introduction of junior secondary which is expected to be both prevocational and academic, senior secondary school which is expected to be comprehensive in its curriculum of the two levels of secondary schools, the junior secondary required more changes in content of instruction (Yoloye, 1984).

Students' Academic Achievement in Biology Subject in Secondary Schools

The teaching of biology as a subject in secondary schools is faced with many problems. The poor academic achievement of students in biology as indicated in the report of WAEC and National Teachers Institute (NTI) as well as the result of state common entrance examination has come a persisted public outcry as regards the falling standard of biology education. Science subjects are already facing a problem. This is mostly in the area of availability of laboratories and other teaching facilities in their right number of students studying science.

Biology is very important subject; it has to be given more priority. It enables one to understand himself and his intermediate environment. Nevertheless, the knowledge acquired in Biology subject is applied in many fields as Medicine, Biochemistry, Pharmacy, Microbiology and Agriculture among others.

Students' achievement in Biology subject in Senior Secondary Certificates Examination (SSCE) has been unsatisfactory over many years. Various reasons have been attached to this problem by scholars. Dinah (2013) concluded that, availability of text books, laboratory apparatus and other learning resources contribute significantly to the performance of students in Biology examination. He added that, students with positive attitude towards the subject register better performance than those who had a negative attitude. Those with positive attitude are motivated to work hard and this is reflected in the good marks scored in the examination. Suman B. (2011) conducted a research on influence of parents' education and parental occupation on academic achievement of students. He concluded that education and occupation of parents positively influence the academic achievement of children. Femi (2012) concluded that education qualification of parents and health status of students are significant factors that affect the academic performance of students. According to Akinsanya et al. (2014) parents' education has the highest significant influence on the academic achievement of students. This is because the child from educated family has a lot of opportunities to study hard due to his/her access to internet, newspaper, television. They can also taught extra lessons at home. Students raised from an illiterate family have limited access to that.

It has been observed that the falling academic standard and the influencing factors include the economic status of the parents. Just having a look at the present economic situation of the country, many poor parents do send their children to go and do pity house hold work before going to school. These children were confused on that they can help their family through that. However, poverty of parents has elastic effects on their children academic works as they lack enough resources and funds to sponsor their education and good school, good housing facilities, medical care and social welfare services. Femi (2012) in his study says, socio-economic and education background of parents is not significant factors in students' performance. Osuafor (2013) in their research on influence of family background on academic achievement of secondary school Biology students revealed that family structure, parents' occupation and educational level of parents did not have significant influence on students' achievement in biology.

Memon (2010) in his study revealed that majority of students whose parents were well educated perform better in matriculation examination as compared to those students whose parents were less

educated or illiterate. Manalanga and Awelani (2014) concluded in their result that the possible factors responsible for the poor performance in Biology 5090 include lack of financial support, lack of equipped libraries, lack of laboratories and Biology textbooks, method of teaching and accessing Biology 5090. Furthermore, practical Biology exam if highly scored improves the KCSE Biology grade. Teachers should be encouraging to assess learners regularly on practical skills. Perhaps, more practical lessons should be availed and documented so that teachers should plan for them and regular inspection to insure the actual order is adhered to (Wabuke, 2013).

The problems of student's under achievement in biology have been observed by many researchers and viewed in different angles due to its diversity. Cohen (1976) put it that "directly or indirectly classroom interactions are controlled by the teacher for it is he who promotes particular learning situation through his choice of objective, organization of experience, selection of materials and methods in order to facilitates the students' academic performance. Owino et al. (2014) attached the problem with inadequate supply of teaching and learning resources such as chemicals, charts, apparatus, models, local specimens, laboratories, textbooks, and libraries led to poor performance in Biology. They added that irregularities related to the teacher of Biology such as irregularity in administration of practical, class discussion, teachers not allowing students to ask questions, teachers not giving prompt feedback on assignments or exams, by not making the Biology subject interesting and teachers not conducting demonstration during practical.

The above mentioned studies indicate the possible factors responsible for low academic performance of students. In order to improve student's achievement and arouse their interest, students have to be taught biology with hands on and different learning materials so as to enable them acquire the cognitive competence and professionals of biology that they need passing biology. The present study will focus on finding the students' academic achievement level in Biology and also to suggest solutions to the problems of poor academic performance of Biology students.

Objectives

The objectives of this paper are:

1. To determine the students' academic achievement in biology for proper, effective, and sound science programs in the secondary school.
2. To examine the factors that influence students' academic achievement in biology.
3. And also identify solutions to the problems that hinder students' performance in biology subject.

Materials and Methodology

Survey was preferred for this study and simple random sampling was used in choosing the participants. Data was collected from 100 respondents who enrolled in form five from five selected secondary schools in Kano District. Each school was allocated with 20 questionnaires for the students to fill. The tools used for the collection of data were questionnaire, documentary analysis of SSCE result for five years (2007-2011), observation and interview. The selected schools are shown in Table 1:

Table 1: Showing the schools selected for the study

S/No	Name of the school	No. of students
1	Government Senior Secondary School, Rano	20
2	Rumfa College, Kano	20
3	Government Senior Secondary School, Goron Dutse	20
4	Government Girls Senior Secondary School, Shekara	20
5	Government Girls Senior Secondary School, Kura	20

The statistical tools used in analyzing the data were frequency table and simple percentages. Histogram was also used in interpreting the result. The formula used for arriving at the respondent percentages is $\frac{\text{Frequency score}}{\text{Total number of the sample}} \times \frac{100}{1}$

Research Questions

Some of research questions have set up in order to receive a feedback from the students, for example, follow are typical questions of the study;

1. What is the level of students' achievement in biology subject?
2. What are the factors responsible for academic achievement of students in biology?
3. How students' learning problems in biology subject be improved to make it more interesting?

Results and Discussion

Concerning the number of laboratories in the selected schools was found to be in adequate because 60% of the students have only one Biology laboratory which will carry the population of the students. Practical is only conducted one to two times (78.7%) in a week despite the fact that 62.7% of the students prefer practical than lecture method of teaching (28%). Furthermore, the laboratory equipment or materials are not adequately available in the selected schools (57.3%). That means the students may not have access to laboratory materials like light microscope and other important materials physically which are needed in any Biology laboratory. The schools have no adequate charts, models; diagrams talk less of mini zoological garden which is all important for proper understanding of biology.

At this modern world, study is incomplete without the use of computer. By making reference from table 2 above, 76% of students have never use computer although 76% of the respondents agree that Computer Assisted Learning will help immensely in the study of Biology. It was also noted that 66.7% of the students never consult their school counselor for an advice in their study. Sure they must be making wrong decisions. The number of students per class is much where 80% of the students were found in one class. On the other hand, 80% of the students in the selected schools have very good parental support and we realized that only 20% of them have poor parental support towards their academic ladder in learning of Biology. Above all, the rural prime and lasting influence is in the home. Musgrove (1966) asserted that "children with ambitions parents tends to be over-achieved" when the school's academic standard, the material standard of the home and parental ambitions were analyzed for their relative importance, parental encouragement were shown to have greatest effect.

The areas of learning difficulties faced by the students of biology are many among which include unfavorable learning environment in the selected schools. Fruser (1978) said "that interesting and more favorable environment tend to encourage good performance, while less favorable environment coupled with less instructional materials tend to promote failure and less-excellence performance in biology. Also students of biology in the selected schools experience difficulties in dealing with biological concepts hence they must be taught empirically so as to aid their understanding and mastery of biological concept.

Likewise, students learning problems in biology subject would become a history in the selected secondary schools through the employment of qualified biology teachers, laboratory assistants, cleaners that would handle both the theoretical and practical aspect of biology in orderly manner. Also provision of more favorable environment, the use of instructional materials models, charts, and laboratory equipment will make learning of biology more interesting. The practical sessions should also be carried out effectively so as to aid a permanent understanding of biology. Excessive use of

words by teachers to aid students understanding should be minimized they tend to do better with personal observations of objectives which concretized their learning skills. The National Policy on Education (NPE) revised (1998) suggested that the mastery of biology concept cannot be fully achieved without the use of learning materials in teaching biology. So, the teaching and learning of biology with inadequate learning materials will certainly result to poor performance. The result is summed up in Table 2 below.

Table 2: Demographic of data responses analysis

S/No.	Item	Frequency	Percentage (%)
1	Gender:		
	Male	45	60.0
	Female	30	40.0
2	Age:		
	16-20	48	64.0
	Above 20	27	36.0
3	Knowledge of Biology subject teacher:		
	Yes	17	22.7
	No	58	77.3
4	Attendance of lesson by the teachers:		
	Yes	60	80.0
	No	15	20.0
5	Number of Biology laboratories in the school:		
	One	45	60.0
	Two	30	40.0
6	How many times do you conduct biology practical in a week:		
	One-two times	59	78.7
	Several times	16	21.3
7	Do you have library in your school?		
	Yes	54	72.9
	No	21	28.0
8	Is your library well equipped?		
	Yes	32	42.7
	No	43	57.3
9	Do you have adequate Biology textbooks in your library?		
	Yes	31	41.3
	No	44	58.7
10	How many periods are allocated to Biology subject per week in your school?		
	Two-three	42	56
	Four and above	33	44
11	What method of teaching Biology is most appropriate for you?		
	practical	47	62.7
	Lecture method	21	28.0
	Field trip	7	9.30
12	How many times do you use computer in Biology lesson:		
	Once	8	10.7
	Twice	10	13.3
	Never	57	76.0
13	Do you think the use of Computer Assisted Learning will improve your academic achievement in Biology subject?		
	Yes	57	76.0
	No	18	24.0
14	How many times do you attend field trip in a term?		
	Two-three times	32	42.7
	Never	43	57.3
15	Do you have school counselor in your school?		
	Yes	31	41.3
	No	44	58.7
16	How many times do you visit your school counselor for advice?		
	Many times	25	33.3
	Never	50	66.7
17	How many students are there in your class?		
	Above 80	60	80.0
	Less than 80	15	20.0
18	Parental support of the child towards learning Biology subject:		
	Very good support	60	80.0
	Poor support	15	20.0

Documentary analysis of SSCE results from 2007-2011

Analyzing and interpretation of the SSCE results in biology subject in the selected schools for five years (2007-2011), a key was used to indicate the schools selected where letters A-E were chosen to represents the selected schools as follows: A=Government Secondary School Gororn Dutse, B=Government Secondary School Rano, C=Government Girls Secondary School Shekara, D=Government Secondary School Rumfa College, and E=Government Girls Secondary School Kura.

From Table 3 below, it was indicated that there was a failure in biology subject in the year 2007 because only 556 (25.5%) students pass biology at credit level and majority of the students in that year numbered 1,625 (74.5%) fail biology at credit level in the selected schools. In 2008, there is also a mass failure in biology subjects in the selected schools whereas out of 2,233 candidates who sat for biology subject in WAEC examination in 2008, only 727 (32.6%) candidates pass biology subject at credit level. The same sequence is followed in 2009 where only 686 candidates pass biology subject at credit out of the total population of the candidates who sat biology subject in that year which are 2317 (70.4%) this shows that 1631 (29.6%), in 2010 there are , 1,920 (76.6%) candidates fail and 586 (23.4%) credit out of 2,507 candidates. At 2011, the result is also the same because only 650 (24.1%) 650 (24.1%) is pass and 2051 (75.9%) candidates failed.

From the result obtained from the analysis we realized that, the level of students' academic achievement in biology was very poor (approximately 73%) out of 11939 candidates who sat for SSCE examination from 2007-2011 in the selected schools. Ajewole (1991) noted that the problem of inadequate facilities for individual or group work coupled with the large classes would appear to worsen the situation and likely to affect the performance of the students. We realized that, inadequacy of laboratory equipment, lack of improvisation by teachers are some of the reasons for the falling standard of education especially in the sciences of which biology is inclusive.

Table 3: SSCE results of the selected schools from 2007-2011

Schools	Pass (credit and above)	Percentage pass (%)	Fail (below credit)	Percentage fail (%)	Total candidates
2007 RESULT					
A	1	0.2	411	99.8	412
B	58	22.7	198	77.3	256
C	85	43.6	110	56.4	195
D	293	29.0	719	71.0	1,012
E	119	38.9	187	61.1	306
Total	556(25.5%)		1625 (74.5%)		2181
2008 RESULT					
A	154	31.4	336	68.6	490
B	96	36.8	165	63.2	261

C	76	36.7	131	63.3	207
D	275	27.9	711	72.1	986
E	126	43.6	163	56.4	289
Total	727 (32.6%)		1506 (67.4%)		2233
2009 RESULT					
A	75	13.3	489	86.7	564
B	85	37.8	140	62.2	225
C	89	43.6	115	56.4	204
D	328	32.2	691	67.8	1,019
E	109	35.7	196	64.3	205
Total	686 (29.6%)		1631 (70.4%)		2317
2010 RESULT					
A	93	14.3	556	85.7	649
B	105	37.6	174	62.4	279
C	67	33.0	136	70.0	203
D	226	21.6	819	78.4	1045
E	96	29.0	235	71.4	331
Total	587 (23.4%)		1920 (76.6%)		2507
2011 RESULT					
A	33	3.7	867	96.3	900
B	61	22.8	207	77.2	268
C	97	39.6	148	60.4	245
D	311	33.5	617	66.5	928
E	148	41.1	212	58.9	360
Total	650 (24.1%)		2051 (75.9%)		2701

Conclusion

After analysis and interpretation of the collected data, the level of students' academic achievement in biology subject is low. The factors responsible for poor academic achievement of students in biology subject includes lack of qualified teachers, lack of attendance of the lesson by the teachers, lack of or insufficient library and laboratory facilities, in adequacy of computers in the schools, and over population of students per class. Also, the students' learning problem in biology subject can be improved by provision of qualified teachers, use of computer assisted learning, and solving the above problems mentioned in point 2 above.

From the assessment of SSCE results from 2007-2011 sessions, it was discovered that 26.9% of the students performed creditably in the selected schools whereas 73.1% if the students performed poorly below credit level. The biology laboratory materials in the selected schools are 42.7% adequate. Majority of the biology laboratories in the selected schools have insufficient laboratory materials corresponding to 57.3%. It was also found that 80% of the students in the selected schools have good parental support towards learning biology subject. So also, 78.7% of the students conduct practical only one to two times in a week which is not enough, 60% have only one biology laboratory. Furthermore, 80% of the selected schools have more than 80 students per class. It was also discovered that 58.7% of the students do not have adequate biology textbooks and 76% of them never use computer in biology lesson, among others are the problems discovered to hinder proper teaching and learning of biology in the selected schools.

Possible solutions were made by both teachers and students that will make biology subject more interesting among which include 76% of the students recommend the use of computers in teaching biology subject, 62.7% of them prefer practical to be giving more priority than theories, 80% suggests that teachers should be fully attending their lessons.

Recommendations

Finally recommended that academic achievement in biology subject can be attain by provision of relevant text books, new modern science library with computers, installation of regular reading habit by students, the maximum number of students per class should be 40-50, zoological and botanical garden in secondary schools should be made available, government should involve in financing projects that will motivate students learning of biology.

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