
DIFFICULT TOPICS IN SECONDARY SCHOOL BIOLOGY CURRICULUM AS PERCEIVED BY SECONDARY SCHOOL STUDENTS IN EZEAGU LOCAL GOVERNMENT AREA OF ENUGU STATE

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Article Received: 10th February, 2019 Article Revised: 20th February, 2019 Article Accepted: 28th February, 2019

Abstract

This study was conducted to determine the difficult topics in secondary school biology curriculum as perceived by secondary school students in Ezeagu Local Government Area of Enugu State. Survey research design was adopted for the study. Three research questions were formulated to guide the study. The population of the study was all the students in the twenty eight (28) public secondary schools in Ezeagu L. G. A.. The sample consisted of three hundred senior secondary school two (SS 2) students randomly selected from ten (10) secondary schools in the area of study. Data was collected using structured questionnaire developed by the researcher and validated by experts with reliability index of 0.97. The collected data collected were analyzed using mean. The findings of the research revealed that mendelian genetics, genes and chromosomes, mitosis and meiosis, nervous system, protein synthesis, DNA synthesis, homeostasis, photosynthesis, enzymes, transport of materials, ecology, evolution, skeletal system, classification and endocrine system were perceived difficult by secondary school student. Lack of suitable models in school, too technical, abstract and complex terminologies and lack of good instructional materials to drive home the lessons among others were identified to be the major cause of the perceived difficulties by secondary school students. Recommendations included among others that Government through grants should restock these laboratories in terms of necessary equipment or apparatus, chemicals, and models and other required teaching and learning materials to ensure effective and efficient teaching of biology in schools. And also, there should be rigorous regular monitoring of the teaching of biology in public secondary schools by the local school authorities as well as by external authorities who may include Post Primary School Management Board (PPSMB) officers, Local Government Education Authorities, and state ministry of education so that the teachers of biology intensify their lesson preparations and improvisation.

Keywords: Difficult topics, Secondary school, Biology, Curriculum

Introduction

Biology is a branch of science that studies life. According to Ndu, Asun and Aina (2012) the word "biology" is derived from two Greek words: "bios" which means life and "logos" which means study. Biology therefore means the study of life or living things. Ekwu (2012) defined biology as a natural science which deals with the study of living organisms. It is derived from two Greek words: "bios" which means life and "logos" which connotes knowledge.

Sarojini (2013) defined biology as a natural science that involves the study of living organisms. It is a fascinating study that ranges from microscopic cellular molecules to the

biosphere, encompassing the earth's surface and its living organisms. The Oxford Advanced Learners Dictionary (Hornsby 2013) defined biology as the scientific study of life and structure of plants and animals. Taylor (2015) defined biology as a science devoted to the study of living organisms.

As a natural science, biology is the individual life forms within the world of life known as nature. Biological studies cover all that is known about plants, animals, microbes, or other living things of the past and present. It is the science of fishes, grasses, flies, grasshoppers, human, mushrooms, flowers, sea stars, worms and moulds. In fact, it is the study of life on top of the highest mountains and at the bottom of the deepest sea.

Biology occupies a unique position in the secondary school education curriculum because of its importance as science of life. In Nigeria, the secondary school Biology curriculum is designed to continue students' investigation into natural phenomena, to deepen students' understanding and interest in biological sciences, and also to encourage students' ability to apply scientific knowledge to everyday life in matters of personal, community, health and agriculture among others (Federal Ministry of Education, 2009). As stated earlier, Biology is a very important science subject and stands as the bedrock upon which are based many other science courses like Medicine, Pharmacy, Nursing, Biochemistry, Genetic, Agriculture etc. that are of great economic importance to a nation. Besides the importance of Biology to mankind as science of life, it is one of the science subjects mostly preferred by many students in the secondary schools because it has less mathematical calculations unlike Physics and Chemistry and deals with non-abstract things. Because of these reasons, Biology has a very high enrolment of students in the external examination (Senior School Certificate Examination) more than Physics and Chemistry. Regardless of the high number of students' enrolment in Biology in the senior school examinations conducted by West African Examination Council (WAEC) and National Examination Council (NECO), reports from scholars and educators (Biology Chief Examiner's Report, 2007; Ige, 2009 and Opara, 2013) indicated that students' Achievement in Biology in the external examinations is poor.

According to WAEC Research Report (2008) and (2009), despite the popularity of Biology, results of research studies always revealed the poor performance of students in the subject. Results from findings revealed that a vast number of factors are responsible for the students' poor performance; among them are: difficult biological concepts (Tekkaya 2011; Çimer, 2014; Zeidan, 2010); the nature of science itself and its teaching methods as well as the biological level of organization and the abstract level of the concepts. Çimer (2011) argued that many concepts or topics in biology, including water transport in plants, protein synthesis, respiration and photosynthesis, gaseous exchange, energy, cells, mitosis and meiosis, organs, physiological processes, hormonal regulation, oxygen transport, genetics, Mendelian genetics, genetic engineering, and the central nervous system can be perceived as difficult to learn by secondary school students. While Tekkaya (2011) found that hormones, genes and chromosomes, mitosis and meiosis, the nervous system, and Mendelian genetics were considered difficult concepts by secondary school students. Özcan, (2013) stressed that experiencing difficulties in so many topics in biology negatively affects students' motivation and achievement. Students' difficulties with many topics in biology have stimulated researchers to investigate why students experience such difficulties and how to overcome these difficulties. Experiencing difficulty in Biology could be attributed to many factors such as classroom learning environment, lack of interest in learning science, overloaded curriculum content and delineation of science from society, among others.

Designing learning environments while ignoring students' interests and expectations causes several learning problems as well as decreasing their interest in biology (Yüzbaşıoğlu and Atav, 2014; Roth., 2006; Zeidan, 2010). Çimer (2011)

indicates that there is a close relationship between students' perceptions of their classroom learning environment and their success. Osborne and Collins (2011) also reported that students' diminishing interest in learning science was due to the curriculum content being overloaded and not generally related to working life, the lack of discussion of topics of interest, the absence of creative expression opportunities, the alienation of science from society and the prevalence of isolated science subjects. Another reason reported by many researchers, specifically in Nigeria, is that due to the nature of biological science, biology learning is generally based on memorization.

Biological science includes many abstract concepts, events, topics and facts that students have to learn. This makes it hard for students to learn them (Çimer, 2011; Saka, 2016; Durmaz, 2007). Also, in addition to determining the factors that negatively affect students' learning in biology, understanding students' views on what makes their biology learning effective is crucial, as many researchers suggest that in order to improve the quality of teaching and learning in school, students' views must be taken into consideration by researchers, teacher educators, schools and teachers (Macbeath and Mortimore, 2011; Çimer, 2011; Ekici, 2010). They argue that what students say about teaching, learning and schooling is not only worth listening to but provides an important perhaps the most important foundation for thinking about ways of improving teaching, learning and schools. For instance, Phoenix (2010) stated that student views of teaching may reflect the ways that they learn best. Indeed, schools that acknowledge the significance of student views have found that these views can make a substantial contribution to classroom management, to learning and teaching, and to the school as a social and learning place (Macbeath, 2010). It is thought that how students perceive the learning environment in biology affects their attitudes towards biology and its learning (Çakiroğlu, 2013; Telli, 2009). Therefore, based on this background the researcher deemed it very crucial to empirically investigate the difficult topics in secondary school biology curriculum as perceived by senior secondary biology students in Ezeagu Local government area of Enugu state.

Statement of the Problem

The nature of science itself and its teaching method are among the difficulties in learning biology in secondary schools. Students learn better when they can actively explore the topics with enough materials. They also prefer a well conducted classroom learning environment that will be more goal oriented, less competitive, more organized and less difficult. Moreover, learning environment for many subjects may vary due to special requirement of the particular subject and is likely to affect the students' perception in science.

Several research works carried out on biology curriculum in Nigeria particularly in Imo and Enugu States have revealed the nonchalant attitude of teachers in the secondary schools towards certain concepts in biology curriculum. There is therefore a problem of which concepts did teachers find difficult to teach and the concepts students find difficult to learn. Then what could be responsible for this? Could it be that teachers themselves neglect or do not teach some areas in the class? Are the methods the teachers use in teaching some areas in biology inappropriate? Therefore the problem of this study is to determine the difficult topics in secondary school biology curriculum as perceived by secondary school students in Ezeagu Local Government Area of Enugu state.

Research Questions

- I. What are the difficult topics in secondary schools biology curriculum as perceived by the students?
- II. What are the factors responsible for the topic difficulties as perceived by secondary school students?
- III. What are the possible solutions to remedy these perceived difficult biology topics?

Methodology

The design adopted for the study is survey research design. The sample comprised of 300 (Three hundred) senior secondary school II students drawn from 10 secondary schools in Ezeagu LGA. The instrument for data collection was structured questionnaire which was validated by experts and with a reliability index of 0.79 using cronbach alpha. Data was analyzed using mean.

Results

Research Question One

What are the difficult topics in secondary schools biology curriculum as perceived by the students?

Table 1: Difficult topics in secondary schools biology curriculum as perceived by the students

S/N	ITEMS STATEMENT	VE	E	D	VD	FX	MEAN	REMARK
1	Mendelian Genetics	60	75	66	117	714	2.38	Difficult
2	Genes and chromosomes	40	70	60	130	620	2.06	Difficult
3	Mitosis and meiosis	28	67	92	113	610	2.03	Difficult
4	Nervous system	140	60	60	40	900	3.00	Not difficult
5	Protein synthesis	36	63	107	94	641	2.13	Difficult
6	DNA synthesis	67	28	112	93	669	2.23	Difficult
7	Excretory system	74	98	84	44	802	2.67	Not difficult
8	Homeostasis	49	61	62	128	631	2.10	Difficult
9	Photosynthesis	84	71	65	80	759	2.53	Not difficult
10	Enzymes	37	63	55	145	592	1.97	Difficult
11	Transport of materials	125	63	65	47	866	2.88	Not difficult
12	Ecology	30	41	120	109	592	1.97	Difficult
13	Cell and organelles	92	108	88	12	880	2.93	Not difficult
14	Evolution	48	52	75	135	633	2.11	Difficult
15	Skeletal system	50	57	80	113	644	2.14	Difficult
16	Reproduction	87	71	59	83	762	2.54	Not difficult
17	Classification	49	28	111	112	614	2.04	Difficult
18	Sensory organs	82	81	61	76	769	2.56	Not difficult
19	Pollution	59	117	65	59	776	2.58	Not difficult
20	Endocrine system	45	63	99	93	660	2.20	Difficult
Grand Mean							2.24	Difficult

From table one above, it was observed that students responded to items 1, 2, 3, 5, 6, 8, 10, 12, 14, 15, 17 and 20 with mean scores lower than the mean benchmark of 2.50 which indicated rejection. This means that those topics under the aforementioned items were perceived as difficult biology topics by secondary school students. However, items 4, 7, 9, 11, 13, 16, 18 and 19 obtained mean scores higher than the mean cutoff point of 2.50. This implies that they are easy topics to the student.

Research Question Two

What are the factors responsible for the topic difficulties as perceived by secondary school students?

Table 2: Factors responsible for the topic difficulties as perceived by secondary school students

S/N	ITEMS STATEMENT	SA	A	D	SD	FX	MEAN	REMARK
21	No suitable models in school	140	60	60	40	900	3.00	Agreed
22	No suitable text books for effecting teaching and learning of those topics	74	98	84	44	802	2.67	Disagree
23	Terms are too technical and complex and abstract	84	71	65	80	759	2.53	Agreed
24	Lack of good instructional materials to drive home the lessons	125	63	65	47	866	2.88	Agreed
25	They are too theoretical and bulky to deal with	109	120	41	30	908	3.02	Agreed
26	No known real life application of these difficult concepts	92	108	88	12	880	2.93	Agreed
27	Complex names, unfamiliar and long names and functions	135	75	52	48	917	3.05	Agreed
28	No internet in school for further research on the difficult topics	87	83	71	59	798	2.66	Agreed
29	Student's poor attitude towards any topic perceived to be difficult	102	123	47	28	899	2.99	Agreed
30	Too many students in the classroom make it difficult for one to concentrate during biology lessons.	45	63	99	93	660	2.20	Disagreed
Grand Mean							2.79	Agreed

The data as presented in table two above showed that items 21, 22, 23, 24, 25, 26, 27, 28 and 29 were all accepted by the students with mean scores above the cutoff point of 2.50 as factors responsible for the difficult nature of these biology topics. On the other hand, item 30 was rejected by the students with mean score below the cutoff point as not being part of the factors responsible for difficulty of some biology topics. Hence the number of students attending biology lesson do not contribute to the difficult nature of some biology topics as perceived by the students.

Research Question Three

What are the possible solutions to remedy these perceived difficult biology topics?

Table 3: Possible solutions to remedy these perceived difficult biology topics

S/N	ITEMS STATEMENT	SA	A	D	SD	FX	MEAN	REMARK
31	Motivation and encouragement of the students by teachers and parents	80	123	61	36	847	2.82	Agreed
32	Teacher should always show special interest in the topics.	84	98	84	34	832	2.77	Agreed
33	Teachers should always use clear and concrete examples all the time in biology teaching and learning	80	81	65	74	767	2.55	Agreed
34	Teachers should frequently use clear and practical examples.	115	73	75	37	866	2.88	Agreed
35	Teachers should be friendly all the time with the students	109	120	41	30	908	3.02	Agreed
36	Teacher should be slow in their explanations to accommodate slow students	102	98	78	22	880	2.93	Agreed
37	Teacher to use adequate instructional resources plus ICT in teaching	100	97	82	21	876	2.92	Agreed
38	Teacher should always repeat the difficult topics as often as possible	87	71	59	83	762	2.54	Agreed
39	Regular assessment should be utilized.	101	102	38	59	845	2.81	Agreed
40	Teachers should conduct practical in lessons involving the difficult topics	98	96	64	48	841	2.80	Agreed
41	Extra time should be awarded to biology lessons in the school time table to give the teachers adequate time to explain the difficult concepts and conduct practical activities.	93	99	47	67	830	2.77	Agreed
Grand Mean							2.80	Agreed

From table three it was seen that students agreed with item 31 with mean score of 2.82 which implies that motivation and encouragement of the students by teachers and parents will go a long way in helping the students to overcome the difficult topics. Also item 32 with mean score of 2.77 maintained that teacher should always show special interest in those topics students perceive to be difficult. On the other hand, item 33 with means score of 2.55 indicated that teachers should always use clear and concrete examples all the time in biology teaching and learning while item 34 with mean point of 2.88 stated that teachers should frequently use clear and practical examples in teaching all the biology topics. In the same way, items 35, 36, 37, 38, 39, 40 and 41 were all accepted by the students with mean scores above 2.50 the mean cutoff point.

Discussions

The findings in table one revealed that difficult topics in biology as perceived by the students includes Mendelian genetics, genes and chromosomes, mitosis and meiosis,

nervous system, protein synthesis, DNA synthesis, homeostasis, photosynthesis, enzymes, transport of materials, ecology, evolution, skeletal system, classification and endocrine system. This was made known by the response of the students which has a grand mean of 2.24 indicating that the afore listed biology topics are considered difficult by the students. This finding above is in line with the findings of Eneje (2014) who found out that both nutrient cycling in nature, ecological management, conservation of natural resources, pests and diseases of crops as well as reproductive system in plants were perceived as difficult by secondary students. Also in line with the findings of this study is the work of Etobro and Fabinu (2017) which outlined nutrient cycling in nature, ecological management, conservation of natural resources, pests and diseases of crops as well as reproductive system in plants as the difficult biology topics as perceived by the students.

The findings in table two revealed that causes of these difficulty as perceived by the students includes among others no suitable models in school, terms are too technical and complex and abstract, lack of good instructional materials to drive home the lessons, no known real life application of these difficult concepts and complex names, unfamiliar and long names and functions. The above findings is in line with the findings of Agbo (2010) who discovered that these difficulties as perceived by the students is as a result of inadequate instructional materials, absence of well-equipped functional laboratories and qualified teachers of biology. Also in line with the above finding is the findings of Etobro and Fabinu (2017) which also enumerated teaching strategies, students' attitude, inadequate learning resources and students' learning habits were the reasons adduced by students of the perceived difficult topics.

Finally, the findings in table three revealed that that the possible solutions to remedy these perceived difficult topics include motivation and encouragement of the students by teachers and parents will go a long way in helping the students to overcome the difficult topics, teacher should always show special interest in those topics students perceive to be difficult, teachers should always use clear and concrete examples all the time in biology teaching and learning, teachers should frequently use clear and practical examples in teaching all the biology topics. The above finding is in line with the recommendations of Etobro and Fabinu (2017) which among other things recommended that use of varied strategies that would involve appropriate instructional materials, use of hands-on and minds-on strategy, integrating biological concepts to daily life and provision of adequate and functional resources.

Conclusions

Based on the findings of this research, the following conclusions were reached:

1. The most difficult biology topics in the biology curriculum that student found difficult to learn included: Mendelian genetics, mitosis and meiosis, genes and chromosomes, DNA synthesis, skeletal system and Evolution.
2. Students found the aforesaid topics difficult to learn due to a number of reasons which, among many others, include: poor teachers' explanations which made it difficult for the students to grasp the concepts under discussion, the topics were characterized by complex terms which were difficult to read and recall. Some of the topics perceived as difficult were mathematical in nature and so they proved to be challenging to students with poor mathematical background.
3. There was also lack of teaching and learning resources including ICT facilities for use by both teachers and students in secondary schools. It was further established that teachers of biology did not conduct practical work when teaching difficult topics, and formative assessment in biology was rarely conducted while feedback to students were normally delayed.
4. Notwithstanding the learning challenges that the students experienced in biology, the study showed that use of effective strategies could greatly lessen the learning

difficulties. These strategies included: teachers needed to provide remedial work for slow students, extra time should be awarded to biology lessons in the school time table to give the teachers adequate time to explain the difficult concepts and conduct practical activities and teachers needed to use appropriate teaching and learning resources including ICT among others.

Recommendations

Based on the findings of this study, the following recommendations are made:

- i. There should be rigorous regular monitoring of the teaching of biology in public secondary schools by the local school authorities as well as by external authorities who may include Post Primary School Management Board (PPSMB) officers, Local Government Education Authorities, and state ministry of education so that the teachers of biology intensify their lesson preparations and improvisation.
- ii. The schools should renovate their biology laboratories, and Government through grants should restock these laboratories in terms of necessary equipment or apparatus, chemicals, and models and other required teaching and learning materials to ensure effective and efficient teaching of biology in schools.
- iii. Government should employ more graduate teachers of biology and post them to all secondary schools across the country as these would not find teaching difficult topics very challenging.
- iv. Government should facilitate the upgrading of biology teachers with low qualifications by sponsoring them for further studies.
- v. Government should establish modern computer laboratories and effective internet connectivity at all public secondary schools in order to promote ICT and integration of ICT in the classroom.
- vi. Schools should strive to marshal their local resources in addition to government grants in order to procure adequate biology text books or reference books for use by students and teachers.

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