# STUDENTS PERCEIVED DIFFICULT TOPICS IN SECONDARY SCHOOL BIOLOGY CURRICULUM: CAUSES SOLUTIONS

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**Abstract**

The study investigated topics students perceived as difficult in secondary school Biology in Nsukka Local Government Area. Four research questions guided the study using descriptive survey research design. The population comprised 2,327 SSIII students in 32 secondary schools in the area, out of which a sample of 300 students were drawn from 10 schools using purposive and simple random sampling techniques. Data were collected using a 4-scale rating scale titled "Biology Topics Students Perceive Difficult" (BTSPD). Reliability index of 0.89 was established using Cronbach alpha. Data were analyzed using mean and standard deviation. Findings of the study revealed that secondary school \biology topics students perceived most difficult include genetics, mitosis and meiosis, nervous coordination, regulation of internal environment, supporting tissues in plants and animals among others. The finding revealed that gender had no influence on perceived difficulty in the topics. Major causes identified for perceived difficulty in those topics include: method of teaching, vast content scope limited teaching periods, poor exposure to practical teachings, poor teaching facilities, among others. Suggested solutions to students' perceived difficulty in some of the topics include that: teachers should adopt learner-centered teaching methods, use simple terminologies to teach, allot more teaching periods to Biology, and should organize regular practical classes among others. The study recommend for use of learner-centered innovative teaching strategies, employment of qualified and content knowledgeable teachers, organizing regular supervisions and inspection of biology teaching and learning, encouraging biology teachers to attend workshops and conferences for knowledge and pedagogical updates among others.

**Keywords:** Perceived Difficult Topics, Achievement, gender and Biology.

## Introduction

Biology is one of the science subjects taught at senior secondary school level in Nigeria. It is a branch of natural science that studies living things and their interrelationship with the environment. Hadjichambis, Hadjichambis, Georgiou, Kyza and Mappouras (2015) defined biology as the natural science that studies living things including their physical structures, chemical processes and molecular interactions, physiological mechanism, development and evolution. Biology studies life and all life processes and their interrelationship with the environment. It is one of the science subjects that attract most patronage by students both Arts and science-oriented students because it involves less calculation and deals with more real life objects unlike Chemistry, Physics and Mathematics. Biology is practical-oriented subject, very interesting but with very vast contents scope.

Biology as science of life pervades every aspect of human endeavours. The secondary school Biology curriculum is designed to prepare students to acquire: adequate laboratory and field skills in biology, meaningful and relevant knowledge in Biology, ability to apply scientific knowledge to everyday life matters of personal and community health and agriculture, reasonable and functional scientific attitude (NERDC, 2009). To achieve these objectives,

students are exposed to various biology topics and contents that enable the students to acquire scientific Knowledge and skills needed for solving day-to-day life problems.

Biology is a prerequisite subject for the study of many important science courses in tertiary institutions such as Medicine, Nursing, Pharmacy, Radiography, and Biology Education among others; that promote human health, agriculture and national development. Regardless of the importance and students' preference of biology to other science subjects, students' achievements in the subject have persistently been reported to be poor. In support of this assertion, studies by researchers: Mberekpe (2013), Musa, (2018) ; Ngwu, Aniaku and Ugwu (2023) revealed students' poor achievement in the subject. Similarly, reports from West Africa Examination Council (WAEC) Biology Chief Examiners' Reports (2018 – 2021) also indicated poor achievement of students in biology. Many research reports have attributed students poor achievement in biology to many factors such as poor method of teaching and vast biology content ( Osuafor & Okigbo, 2013 and Agboroma & Oyovwi, 2015), lack of science equipment and poor quality of science teachers (Olaleye, Ajayi, Oyebola & Ajayi, 2017) among others.

Achievement is the outcome of educational objective, the extent to which students, teachers or institution achieved their stated educational objectives or goals. Akani (2017) defined academic achievement as all the knowledge, students and ideas gained in the course of an academic programme. Edeh (2015) referred to academic achievement as the scholastic standing of a student at a given moment which states learners' intellectual abilities which can be measured by grades obtained from examinations tests or quiz. Academic achievement is an important education variable that expresses the success and failure of a teaching/learning process and the extent educational goals are attained. However, students' academic achievement and perception of difficult topics may be influenced by gender.

Gender is a socio-cultural concept whereby a society ascribes different roles, values, attitude to males and females. Okeke (2016) defined gender as the socio-cultural constructed characteristics and roles which are ascribed to male and female by the society. Gender is culturally determined trait associated with males and females. According to Nzewi (2010) individual grows, the individual is socialized into the society to fit into certain roles prescribed by the society as masculine or feminine such as behavior, belief, value and roles. This socio-cultural misconceptions or assumptions may interact with some academic factors such as motivation, attitude, interest and perception of difficult topics to affect students' achievement. In view of these, this study determined the influence of gender on students' perceived difficulty in some biology topics.

The Nigerian secondary school biology curriculum has a very vast content scope. These contents are prepared to cover four major themes: Organization of life, Organisms at work, The organism and its environment, and Continuity of life (NERDC, 2009) these major themes are further developed into about 54 major topics ranging from concept of life - food production and storage with many sub-topics (SimbiBot, 2024). These topics provide a very vast contents in the teaching syllabus which students must cover within limited teaching periods before the Senior School Certificate Examinations (SSCE). Nevertheless, some of these topics are perceived difficult by students and may contribute to students' poor achievement in the subjects.

A topic is considered difficult, when such a topic is different to understand by the learners. Akinnubi, Oketayo, Akinwande and Ifedayo (2013) and Edeh (2015)defined difficult topics as those topics teachers and students find difficult to teach and learn respectively. Studies by researchers indicate that many topics are perceived difficult by students; Etobro and Fabinu (2017) reported that students perceive topics such as genetic, genetic crossing, mitosis and meiosis, adaptation and sex determination difficult. Subsequently, Samba and Eriba (2012)

identified cell, physiological processes and hormonal regulation as biological concepts perceived difficult by students. Akinnubi et-al (2013) also identified genetic crossing and linkages, meiosis and mitosis, nervous system as topics perceived difficult by students while Igbojinwaekwu and Dorgu (2019) recorded adaptation for survival as another topic perceived difficult by secondary school students study conducted by Alfiraida (2018) also indicated that coordination system and immune system are perceived difficult by student. In view of the consistence reports on many topics students perceive difficult, students' achievement in biology may persist to be poor and calls for suggestions and solutions.

**Statement of Problem**

The Nigerian secondary school curriculum has a vast content scope and the knowledge of all the topics are important and needed for better life existence. Hence, the persistent report on students' poor achievement in biology needs to be addressed through finding solutions to topics students perceive difficult. In view of this, the study identified topics students perceive difficult in biology, the causes and suggest ways of making such topics less difficult to teaching and learning to promote students' achievement in biology.

**Purpose of the Study**

The general purpose of this study was to determine biology topics students perceived difficult in secondary school. Specifically, the study sought to determine:

(1) Identify biology topics students perceive difficult in secondary school.
(2) Find out the major causes for the perceived difficulty in those topics.
(3) Determine the influence of gender on perceived difficult topics.\suggest possible solution to the causes of perceived difficulty on the topics and
(4) Suggest possible solutions to making those topics less difficult for teaching and learning.

**Research Questions**

The following research questions guided the study

1. What are the topics students perceive difficult?
2. What are the causes of students' perceived difficulty of the biology topics?
3. What is the influence of gender on perceived difficult topics in biology?
4. What are the possible solutions to the causes of students' perceived difficulty in the topics?

**Methods**

The study was carried in Nsukka Local Government Area. Descriptive research survey design was employed. Population of the study comprised 2,327 SS III students in 32 public schools in the area. A sample of 300 (150 males and 150 female) SS III students drawn from 10 co-educational public secondary schools using multi-stage sampling procedure consisted of purposive sampling and simple random sampling techniques respectively. Data for the study were collected using a 4-point rating scale titled 'Biology Topics students perceive difficult in secondary school (BTSPD)'. The instrument consists of two sections: A and B. Section A consists of the demographic characteristics such as gender while section B consists of three clusters each consists of a 4-scale response item statements (Strongly Agree, Agree, Disagree and Strongly Disagree) and scoring scale of (3.50-4.00, 2.50-3.49, 1.50-2.49, 1.00-1.49) respectively aimed to illicit information on topics students perceive difficult in biology, causes of perceived difficulty , influence of gender on perceived difficult and suggested solutions. The instrument was validated by three experts: two in Biology unit and one in Measurement

and Evaluation unit all in Department of Science Education, University of Nigeria Nsukka. The overall reliability index of 0.89 was established using Cronbach Alpha. Data collected were analyzed using mean ($\overline{X}$) and standard deviation (SD). A decision rule of 2.50 was established indicating that any response with the mean below 2.50 is not accepted while any response with mean above 2.5 in accepted.

## Results

**Research Question One:** What are the biology topics students perceive difficult?

**Table 1:** Mean and Standard Deviation of students' perceived difficult topics in Biology

| S/N | Biology Topics | SA | A | D | SD | $\overline{X}$ | S.D | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | Recognizing living things | 38 | 49 | 123 | 90 | 1.23 | 3.31 | Disagreed |
| 2 | Classification of living things | 39 | 58 | 116 | 87 | 1.28 | 1.12 | Disagreed |
| 3 | The cell | 45 | 72 | 100 | 83 | 2.12 | 2.79 | Disagreed |
| 4 | The cell and its environment | 42 | 74 | 103 | 78 | 2.14 | 0.92 | Disagreed |
| 5 | Some properties and functions of the cell | 50 | 79 | 100 | 71 | 2.25 | 3.12 | Disagreed |
| 6 | Tissues and supporting systems | 71 | 98 | 79 | 52 | 3.11 | 1.23 | Agreed |
| 7 | Nutrition in animals | 50 | 67 | 100 | 83 | 2.12 | 3.14 | Disagreed |
| 8 | Basic ecological concepts | 39 | 54 | 111 | 96 | 1.29 | 0.94 | Disagreed |
| 9 | Functioning ecosystems (i) Autotrophy and heterotrophy (ii) Food webs and tropic level | 41 | 70 | 101 | 88 | 1.42 | 2.24 | Disagreed |
| 10 | Energy transformation in nature | 51 | 82 | 107 | 60 | 2.31 | 3.12 | Disagreed |
| 11 | Relevance of Biology to Agriculture | 38 | 46 | 118 | 98 | 1.34 | 0.95 | Disagreed |
| 12 | Micro-organisms | 91 | 119 | 52 | 38 | 3.52 | 2.38 | Disagreed |
| 13 | Aquatic habitat (Marine habitat estuarine habitat and freshwater habitat) | 47 | 66 | 107 | 80 | 2.24 | 1.43 | Disagreed |
| 14 | Terrestrial habitat (i) Marsh (ii) Forest (iii) Grasslands (iv) Arid land | | 63 | 99 | 94 | 2.11 | 3.32 | Disagreed |
| 15 | Reproduction in Unicellular organisms and invertebrates | 87 | 123 | 47 | 43 | 3.67 | 2.49 | Agreed |
| 16 | Classification of plants | 59 | 78 | 95 | 68 | 2.21 | 3.41 | Disagreed |
| 17 | Digestive system | 61 | 98 | 79 | 62 | 2.52 | 2.49 | Agreed |
| 18 | Transport system | 67 | 80 | 85 | 68 | 2.41 | 1.34 | Disagreed |
| 19 | Respiratory system | 52 | 71 | 102 | 75 | 2.01 | 3.18 | Disagreed |

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|---|---|---|---|---|---|---|---|---|
| 20 | Excretory systems | 43 | 57 | 106 | 94 | 1.81 | 3.35 | Disagreed |
| 21 | Nutrient cycling in nature | 39 | 62 | 111 | 88 | 1.72 | 2.29 | Disagreed |
| 22 | Ecological management (i) Association (ii) Tolerance (iii) Adaptation (iv) Pollution | 39 | 58 | 116 | 87 | 1.28 | 1.12 | Disagreed |
| 23 | Conservation of natural resources | 59 | 78 | 95 | 68 | 2.21 | 3.41 | Disagreed |
| 24 | Pests and diseases of crops | 83 | 107 | 61 | 49 | 2.81 | 1.23 | Agreed |
| 25 | Reproductive system in vertebrates | 67 | 80 | 85 | 68 | 2.41 | 1.34 | Disagreed |
| 26 | Reproductive systems in plants | 81 | 103 | 64 | 52 | 2.72 | 3.12 | Agreed |
| 27 | Pollination in plants | 38 | 46 | 118 | 98 | 1.34 | 0.95 | Disagreed |
| 28 | Regulation of internal environment | 45 | 72 | 100 | 83 | 2.12 | 2.79 | Agreed |
| 29 | Nervous co-ordination | 93 | 122 | 49 | 36 | 3.82 | 0.94 | Disagreed |
| 30 | Sense organs | 38 | 46 | 118 | 98 | 1.34 | 0.95 | Disagreed |
| 31 | Ecology of population | 47 | 72 | 102 | 79 | 2.13 | 3.92 | Disagreed |
| 32 | Balance in nature | 52 | 71 | 102 | 75 | 2.01 | 3.18 | Disagreed |
| 33 | Reproductive systems and reproduction in humans | 39 | 62 | 111 | 88 | 1.72 | 2.29 | Disagreed |
| 34 | Development of new seeds | 45 | 59 | 108 | 88 | 1.72 | 4.43 | Disagreed |
| 35 | Fruits | 59 | 78 | 95 | 68 | 2.21 | 3.41 | Disagreed |
| 36 | Reproductive behaviours | 52 | 71 | 102 | 75 | 2.01 | 3.18 | Disagreed |
| 37 | Biology of heredity (genetics) | 98 | 121 | 44 | 37 | 3.89 | 1.34 | Disagreed |
| 38 | Variation and adaptation | 102 | 116 | 47 | 35 | 3.86 | 3.18 | Agreed |
| 39 | Evolution | 47 | 72 | 102 | 79 | 2.13 | 3.92 | Disagreed |

Table 1 shows the mean and standard deviation of students' perceived difficult topics in Biology. The benchmark for the decision is 2.5, whereby if the mean is >2.5, it is agreed that the topic is difficult, and if the mean is <2.5, then it is disagreed that the topics is difficult. The data in table 1 shows that the students agreed that they perceived topics such as tissues and supporting systems (mean = 3.11), micro-organisms (mean = 3.52), reproduction in unicellular organisms and invertebrates (mean = 3.67), Digestive system (mean = 2.52), pest and disease of crops (mean = 2.81), reproductive system in plants (mean = 2.72), nervous co-ordination (mean = 3.82), biology of heredity (genetics) (mean = 3.89), and variation and adaptation (mean = 3.86) as difficult.

**Research Question Two:** What are the causes of students perceive difficulty in some biology topics?

**Table 2:** Mean and Standard Deviation of causes of the students perceived difficulty in Biology topics

| S/N | Biology Topics | SA | A | D | SD | $\overline{X}$ | S.D | Decision |
|---|---|---|---|---|---|---|---|---|
| 40 | Abstractness of Biology topics | 92 | 114 | 53 | 41 | 3.32 | 0.72 | Agreed |
| 41 | Unavailable instructional materials | 100 | 115 | 48 | 37 | 3.76 | 3.18 | Agreed |
| 42 | Insufficient time allocation to teach topics | 92 | 116 | 51 | 41 | 3.69 | 1.41 | Agreed |
| 43 | Complexity of biology topic | 104 | 131 | 35 | 30 | 3.81 | 3.24 | Agreed |
| 44 | Lack of practical classes | 98 | 121 | 44 | 37 | 3.79 | 2.34 | Agreed |
| 45 | Poor attitude of teachers to teaching | 73 | 100 | 78 | 49 | 2.63 | 0.91 | Agreed |
| 46 | Misconception of topics | 101 | 113 | 47 | 39 | 33.21 | 2.13 | Agreed |
| 47 | Poor study habits | 78 | 92 | 80 | 50 | 2.82 | 1.24 | Agreed |
| 48 | Topic is too vast | 106 | 119 | 42 | 33 | 3.87 | 3.12 | Agreed |
| 49 | Lack of appropriate teaching strategy | 64 | 96 | 78 | 62 | 2.74 | 0.54 | Agreed |

Data in Table 2 showed that items 40 to 49 had mean ratings of 3.32, 3.76, 3.69, 3.81, 3.79, 2.63, 3.21, 2.82, 3.87, and 2.74, with the corresponding standard deviation of 0.72, 3.18, 1.41, 3.24, 2.34, 0.91, 2.13, 1.24, 3.12 and 0.54 respectively. All the mean ratings are above the benchmark of 2.50. Therefore, all the items in Table 2 are causes of student's perceived difficulty in some Biology topics.

**Research Question Three:** What is the influence of gender on topics students' perceive difficult in biology

**Table 3:** Mean and Standard Deviation of gender on perceived difficult topics in biology

| Grouping | N | $\overline{X}$ | SD |
|---|---|---|---|
| Male | 150 | 2.21 | 1.60 |
| Female | 150 | 2.23 | 1.47 |

Table 3 show that the male students' perceived difficult topics in Biology is 2.21 and standard deviation of 1.60 while the mean female students' perceived difficult topics inis 2.23 and standard deviation of 1.47. The mean difference of 0.13 indicated that gender has no significant influence on topics students' perceive difficult in Biology.

**Research question Four**: What are the suggested solutions to biology topics students perceive difficult

**Table 4:** Mean and Standard Deviation of solutions to topics students perceived difficult in biology

| S/N | Biology Topics | SA | A | D | SD | $\overline{X}$ | S.D | Decision |
|---|---|---|---|---|---|---|---|---|
| 50 | More practical classes to teach abstract Biology topics | 92 | 119 | 49 | 40 | 3.74 | 1.24 | Agreed |
| 51 | Provision of adequate learning materials | 89 | 112 | 56 | 43 | 3.65 | 1.60 | Agreed |
| 52 | More time allocation to teach perceived difficult topics | 98 | 128 | 40 | 34 | 3.86 | 1.47 | Agreed |
| 53 | Simplification of complex biology topics | 106 | 131 | 34 | 29 | 3.91 | 2.26 | Agreed |
| 54 | Improving teacher's attitude to teaching perceived difficult topics. | 97 | 123 | 47 | 33 | 3.72 | 0.59 | Agreed |
| 55 | Application of appropriate teaching strategies (learning-centered methods) | 90 | 107 | 56 | 47 | 3.61 | 0.72 | Agreed |
| 56 | Improvement on student habits | 73 | 100 | 78 | 49 | 2.81 | 2.13 | Agreed |

Data in Table 4 showed that items 50 to 56 had mean rating of 3.74, 3.63.86, 3.91, 3.72, 3.61 and 2.81, with the corresponding standard deviation of 1.24, 1.60, 1.47, 2.26, 0.59, 0.72 and 2.13 respectively. All the mean ratings are above the benchmark of 2.50. Therefore, all the items in Table 4 are possible solution to teaching and learning of perceived difficult topics in Biology.

**Summary and conclusions of the Findings**

1. The major findings of the study indicates that some of the biology topics students perceive most difficult are: Genetics ($\overline{X}$=3.89),Variation and Adaptation ($\overline{X}$=3.86) Nervous Coordination ($\overline{X}$=3.82) Reproduction in invertebrates (unicellular organisms) ($\overline{X}$=3.67) Micro-organisms in our Environment ($\overline{X}$=3.52) and Tissue and Supporting systems ($\overline{X}$=3.11) among others
2. All the items in Table 2 were accepted as causes of students' perceived difficulty in some Biology topics.
3. Gender has no significant influence on topics students' perceive difficult in Biology
4. All the items in Table 4 were all accepted as possible solutions to the perceived difficult topics in Biology.

**Recommendation**

Based on the above findings, this study recommend that student-centered innovative teaching strategies such as computer simulations, flipped classroom, blended learning and more should be adopted by teachers to for better understanding of those topics, that more time should be allotted to biology teaching periods because of its vast content scope, that teachers should organize practical classes regularly when needed because biology is practical-oriented subject among others.

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