



Identification of Perceived Difficult Topics in Senior Secondary School Biology Curriculum in Zamfara State

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Abstract: This descriptive survey research aimed to identify the topics within Senior Secondary (SS) I – II biology curriculum perceived as difficult by SS II students and biology teachers. The population comprised 27,375 SS II students and 209 biology teachers in Zamfara State. The sample size of 378 students were sampled using random sampling technique, while 48 biology teachers having minimum of 5 years of teaching experience were purposively selected. An instrument titled Difficult Biology Topics Scale with reliability coefficients of 0.82 was used for data collection. Two research questions and one null hypothesis guided the study. Mean and standard deviation were used to answer the research questions while the hypothesis was tested using t-test at 0.05 level of significance. The findings revealed that, in all the listed 30 biology topics, SS II students and their teachers identified Nutrition in animals, Respiratory system, and Pests and diseases of crops as difficult. More so, SS II students identified the topic Cell and its environment, Functioning ecosystems, and Nutrient cycle as difficult, while teachers considered them easier. The disparity in perceived difficulty levels of 30 biology topics between SS II students and teachers was statistically significant ($t=2.51$, $df=424$, $p=0.030$). The study recommends targeted professional development for biology teachers and use of student-centered approaches in remediating the perception that some biology topics are difficult.

Keywords: Secondary School, Student, teacher, Biology curriculum, perceived difficult topics.

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INTRODUCTION

Biology, as a secondary school subject, serves as a fundamental and indispensable component of the science curriculum, offering students with a comprehensive understanding of the living world. The subject provides a unique gateway for students to understand the intricate mechanisms governing life, from the molecular and cellular levels to the broader ecosystems as well as compulsory subject requirement for studying medicine and allied courses (Badmus & Omosewo, 2018; Chukwuemeka & Dorgu, 2019; Edeh & Martha, 2020; Isma'il & Lukman, 2022; Oyovwi, 2021). While no longer

considered a core subject in Nigerian secondary schools as per the National Policy on Education [FRN] (2013), biology subject continues to draw significant interest from non-science students (Matazu & Isma'il, 2023; Isma'il & Lukman, 2022). Therefore, identifying perceived difficult topics in the subject is of utmost significance within the secondary school curriculum, as it will shed light on specific areas where both teachers and students encounter challenges and necessitate additional support.

The widely held fallacy that biology is the easiest of science subjects, especially in the context of

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teaching and learning of the subject, has been contested. For instance, Ogunkola and Samuel (2011) argued that biology is often considered more interesting and easier to study due to its focus on the human body, contrasting with the perceived abstractness of concepts in physics and chemistry. A study conducted by Musonda (2021) further supported this argument, revealing that a majority of students (42%) consider biology their favourite science subject, suggesting a widespread belief in its ease compared to physics and chemistry. However, contrary to the popular assumption, biology contains some challenging topics, partly owing to its inherent complexity. Reiss and Winterbottom (2021) stated that biology encompasses numerous key concepts, potentially more than those in chemistry or physics. Similarly, Salleh, Ahmad, and Setyaningsih (2021) emphasized the loaded nature of the biology curriculum with numerous terminologies, processes, and biological concepts that demand understanding and mastery. Ahmad and Jamil (2019) and Fauzi, Miftachulia, Rohma, and Khoiroh (2021) concurred, stressing that biology comprises many difficult concepts.

The perception that biology is not a difficult subject has been linked to the absence or scarcity of mathematical calculations in its topics. For example, Reiss and Winterbottom (2021) contended that, unlike chemistry and physics, biology at the secondary school level does not require calculus. However, Moses (2013) argued that a solid mathematical background is essential for comprehending mathematical topics within biology, such as genetics and probability. According to Kyado, Abah, and Samba (2019), the lack of proper understanding of some concepts in biology makes it challenging for students to grasp them. Abidoeye and Omotayo (2023) similarly contributed to this line of argument, asserting that the teaching of biology is considered to be difficult because of its abstract nature. This line of argument finds support in the West African Examinations Council [WAEC] (2021) Chief Examiners' report, which attributes poor performance to students' inadequate understanding of some biology topics or concepts such as the nervous system, physiological features, and genetics concepts. Likewise, previous research findings have established a link between poor performance in biology and students' perception of difficulty in certain topics (Edeh & Martha, 2020; Ezechi, 2019; Ozcan, Ozgur, Kat, & Elgun, 2014). These negative perceptions, according to Chinyere and Constance (2020), may be attributed to teachers' insufficient mastery of the subject matter and pedagogical skills, as well as students' attitudes towards specific biology topics.

Perception plays a central role in understanding the difficulty associated with certain biology topics. According to Ahmed, Moradeyo and Danmole (2017), perception have important consequences on output. Sarpaku (2016) defined a person perception as his or her ability to notice and understand things that are not obvious to other people. Ahmed *et al.*, (2017) sees perception as the way we judge or evaluate others and things. Sarpaku (2016) stressed that, "perception is valuable because it influences the information that enters a working memory. Hence, background knowledge in the form of schemas affects perception and subsequent learning" (p. 31). Ogunkola and Samuel (2011) defined students' perception of difficult topics as their views on the ease or difficulty of understanding particular science curriculum topics.

For the purpose of this study, the focus on perceived difficult biology topics was not limited to the perspectives of students only but also that of biology teachers. This aligns with Salleh *et al.*, 's (2021) emphasis on the key role of teachers as curriculum implementers having several years of teaching experience. This emphasis also finds support in Kubiato, Torkar, and Rovnanova's (2020) findings that biology teachers significantly influence students' perception of the subject. The impact of teachers' perceptions extends beyond the classroom, affecting students' attitudes and achievements. Abe and Owoeye (2016) highlighted that teachers, compelled by the centralized educational system, may skip or struggle to teach topics they find difficult, adversely affecting students' performance. This aligns with Moses's (2013) observation that some biology teachers fail to handle perceived difficult topics effectively, leading to poor student performance.

The recent National Universities Commission's [NUC] Core Curriculum Minimum Academic Standards (CCMAS) for Nigerian universities introduced a course titled General Biology Methods I, for undergraduate biology education students where it emphasizes the significance of "identification of difficult topics in biology with justification" (NUC, 2023, p. 146). The objective is to provide Trainee Biology teachers with in-depth understanding of these identified difficult topic and offer insights for targeted strategies in the "use of appropriate methods in the teaching of difficult topics in biology" (NUC, 2023, p. 146), when they eventually join the teaching profession. In this study, difficult topics refers to those topics in the senior secondary school (SS) I and II biology curriculum which SS II students and/or their biology teachers may find difficult to learn or teach respectively, within a secondary school system. Naturally, students find examination questions

related to these topics tough, and, conversely, biology teachers may ignore or skip them, as a result of lower self-efficacy in imparting their content effectively to students.

Several empirical studies have been conducted to identify perceived difficult topics in senior secondary school biology curriculum. In the study conducted by Edeh and Martha (2020) in Nkanu East, Enugu State, Nigeria, a survey research approach was employed to identify perceived difficult biology topics. The study, which included 100 secondary school students from five schools, revealed that genetics, evolution and, the cell and its environment were identified as particularly difficult topics. Similarly, Anidu and Onah (2020) focused on the senior secondary biology curriculum in Abia State, Nigeria. Their survey included 55 undergraduate Biology Education students from two universities. Their findings revealed that, out of the 37 senior secondary biology curriculum topics listed, 13 topics were perceived to be difficult by the majority of preservice biology teachers. The identified difficult topics were Cell and its environment, Functioning Ecosystem, Microorganism around us, Unicellular Organisms and Invertebrates, Nutrients Cycling, Ecological Management, Pests and Diseases of Crops, Reproductive System in Vertebrates, Regulation of Internal Environment, Nervous Coordination, Genetics, Variation and Evolution.

Another survey research conducted by Ezechi (2019) investigated difficult topics in the secondary school biology curriculum, as perceived by 28 SS II secondary school students. The findings of the study 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 the students. Salleh *et al.*, (2021) conducted a study in Selangor, Malaysia, involving 352 students and 71 biology teachers. The findings revealed that students struggled with nutrition, cell division, and chemical composition, while teachers found cell division, respiration, and nutrition particularly challenging. Chukwuemeka and Dorgu's (2019) descriptive survey research in Isoko North, Delta State, Nigeria, with sample of 200 SS 3 students. Nervous coordination emerged as the most perceived difficult biology topic according to both male and female students.

A study conducted by Byukusenge, Nsanganwimana and Tarmo (2022) explored the difficulties faced by biology teachers in teaching the revised Rwandan curriculum. The study, which

included 67 biology teachers, revealed that, 17 topics out of the 55 were perceived difficult to teach and to learn. Notable among them were Molecular biology and biotechnology-related topics such as genetic engineering, gene technology, genetics, cell division, DNA replication, and protein synthesis. Another research conducted by Frederick-Jonah and Tobi (2022) who rooted their research in constructivism theory, examined students' difficulties in learning the concept of the cell. Two hundred SS 3 students were sampled from public and private schools, revealing that students found the cell division process especially challenging. Haruna (2021) investigated perceived difficult biology concepts among SS II students in Kano State, Nigeria, with 400 participants. The findings of study revealed that, nutrient cycling in nature, ecological management, conservation of natural resources, pests and diseases of crops as well as reproductive system in plants were the five major topics in which students usually have difficulties in. Moses (2013) conducted a survey across two districts in Zambia, involving heads of departments, biology teachers, and high school students. The findings of the study revealed that the most perceived difficult topics in descending order of difficulty were; Mendelian genetics, mitosis and meiosis, genes and chromosomes, DNA synthesis, skeletal system and evolution.

The related empirical studies reviewed (e.g. Anidu & Onah, 2020; Ezechi, 2019; Salleh *et al.*, 2021) on the identification of perceived difficult biology topics in senior secondary school biology curriculum across different countries, including Nigeria, Malaysia, Rwanda, and Zambia, consistently indicated that certain topics are perceived difficult or challenging for both students and teachers. Genetics, evolution, the cell and its environment, nervous coordination, and various molecular biology emerge as recurrent perceived difficult topics. The perceptions seem to transcend geographical boundaries, suggesting that certain biology concepts are universally perceived as difficult by students and teachers. This consistency across diverse locations implies that there might be shared challenges and misconceptions in understanding these identified topics.

Despite the widespread perception that biology is an inherently simple and straightforward subject, empirical evidence suggests that certain topics within the curriculum pose significant difficulty for both teachers and students. On the global scale, the existing literature primarily focuses on students' perspectives, with limited emphasis on the perception of biology teachers. Again, the existing literature revealed varied findings across different

countries and regions, indicating a need for a localized identification of the biology topics perceived as being difficult to teach or learn. Literature search indicated that, specific topics perceived as difficult by secondary school students and biology teachers in Zamfara State remain largely unexplored. This gap hinders the development of targeted strategies to address persistent poor performance related to challenging biology topics in the state. To bridge this gap, this study focus on identifying biology topics within SS I – SS II biology curriculum perceived as difficult by SS II students and teachers in Zamfara State in bid to provide recommendations in addressing the problem.

Research Questions

The following research questions were raised to guide the study:

1. Which topics within SS I – SS II biology curriculum are perceived as difficult to teach by biology teachers or learn by SS II students?
2. Is there difference in the mean ratings of the perceived difficult level of SS I – SS II biology topics between SS II students and biology teachers?

Null Hypothesis

The following null hypothesis was formulated for the study

H0₁: There is no significant difference in the mean ratings of perceived difficult level of SS I – SS II biology topics between SS II students and biology teachers.

METHOD

The research employed a descriptive survey design to identify topics within SS I and SS II biology curriculum that are perceived as difficult by SS II students and biology teachers in Zamfara State. The target population comprised 27,375 SS II students and 209 biology teachers across 166 public senior secondary schools in Zamfara state. Using a random sampling technique, 378 student participants were sampled for the study. The sample size was determined using The Research Advisor (2006). Forty eight (48) biology teachers having a minimum of 5 years teaching experience were selected through purposive sampling technique for the study.

To collect data, a survey questionnaire titled "Difficult Biology Topics Scale (DBTS)" was

developed. DBTS was made up of two sections; Section A which solicit for respondents' demographic information and Section B which contain a list of 30 biology topics in the SS I and SS II of National Education Research and Development Council [NERDC] (2009) Senior Secondary Biology Curriculum. Each topic was rated on a 4-points Likert scale of "Very Difficult" (VD), "Difficult" (D), "Slightly Difficult" (SD), and "Not Difficult" (ND) corresponding to 4, 3, 2, and 1 points, respectively. The pattern of DBTS was also employed by Anidu and Onah (2020), Edeh and Martha (2020), Haruna (2021), Byukusenge *et al.*, (2022) and Frederick-Jonah and Tobi (2022). The score of ≥ 2.50 indicated a perceived difficulty, while score ≤ 2.49 indicated that the topic is perceived as being easy. The DBTS was validated by a team of experts. The reliability coefficient for DBTS was determined using pilot study data collected from 46 SS II biology students and 20 biology teachers from three schools within the population of the study that were not part of the main research sample. Cronbach Alpha test yielded 0.82 reliability coefficient indicating higher reliability of DBTS to be used for the study.

In line with ethical considerations, the researcher obtained an introductory letter from the Faculty of Education and Extension Services, Usmanu Danfodiyo University, Sokoto, presented it to the Zamfara State Ministry of Education and was granted permission to use the public senior secondary schools in the state. This was communicated to the principals of the sample schools. Both students and teachers' participants were administered DBTS at the end of third term of the 2022/2023 academic calendar. Distribution and retrieval of the DBTS were conducted with the help of three research assistants. The responses obtained were coded and analysed using Means and Standard Deviation to answer the research questions posed while the null hypothesis was tested using t-test at 0.05 level of significance. All the analyses were run using Statistical Package for the Social Sciences (SPSS) software.

RESULTS

The findings of the study are presented in line with the research questions and the hypothesis that guided the study.

Research Question One: Which topics within SS I – SS II biology curriculum are perceived as difficult to teach by biology teachers or learn by SS II students?

Table 1: Mean and Standard Deviation for Difficult Topics within SS I – SS II Biology Curriculum

SN	Topics	SS II Students (n=378)			Biology Teachers (n=48)		
		Mean	SD	Decision	Mean	SD	Decision
1.	Recognizing living things	2.35	0.93	Easy	1.87	0.82	Easy
2.	Classification of living things	2.12	0.98	Easy	1.96	0.86	Easy

SN	Topics	SS II Students (n=378)			Biology Teachers (n=48)		
		Mean	SD	Decision	Mean	SD	Decision
3.	Kingdoms	2.41	0.91	Easy	1.82	0.79	Easy
4.	The cell	2.35	1.02	Easy	1.08	0.90	Easy
5.	The cell and its environment	2.98	0.86	Difficult	1.15	0.97	Easy
6.	Properties and functions of the cell	2.42	0.83	Easy	1.78	0.74	Easy
7.	Tissues and supporting systems	2.38	0.95	Easy	1.99	0.84	Easy
8.	Nutrition in animals	3.26	0.70	Difficult	2.61	0.91	Difficult
9.	Basic ecological concepts	2.47	0.94	Easy	1.89	0.82	Easy
10.	Functioning ecosystems	2.77	1.04	Difficult	2.05	0.95	Easy
11.	Energy transformation in nature	2.45	0.98	Easy	2.02	0.87	Easy
12.	Relevance of biology to agriculture	2.20	0.92	Easy	1.07	0.81	Easy
13.	Microorganisms around us	2.39	0.98	Easy	1.44	0.81	Easy
14.	Microorganisms in action	2.32	0.94	Easy	1.48	0.85	Easy
15.	Towards better health	2.30	1.01	Easy	1.12	0.93	Easy
16.	Aquatic habitat	2.35	0.98	Easy	1.10	0.85	Easy
17.	Terrestrial habitat	2.38	0.96	Easy	1.01	0.83	Easy
18.	Unicellular organisms and invertebrates	2.27	0.91	Easy	1.22	0.80	Easy
19.	Classification of plant	2.29	0.96	Easy	2.01	0.84	Easy
20.	Digestive system	2.25	1.02	Easy	2.06	0.90	Easy
21.	Transportation system	2.20	0.98	Easy	1.05	0.87	Easy
22.	Respiratory system	3.23	0.85	Difficult	2.53	0.90	Difficult
23.	Excretory system	2.32	0.92	Easy	1.98	0.80	Easy
24.	Nutrient cycle in nature	3.17	0.89	Difficult	2.21	1.01	Easy
25.	Ecological management	2.35	1.04	Easy	1.20	0.92	Easy
26.	Conservation of natural resources	2.30	1.01	Easy	1.05	0.89	Easy
27.	Pests and diseases of crops	3.29	0.84	Difficult	2.51	0.88	Difficult
28.	Reproductive system in vertebrates	2.22	0.96	Easy	2.07	0.84	Easy
29.	Reproductive system in plants	2.43	0.98	Easy	2.10	0.85	Easy
30.	Pollination in plants	2.30	1.02	Easy	1.15	0.90	Easy

Keys: ≥ 2.50 = Perceived difficult, ≤ 2.49 = Perceived easy

Source: Research Fieldwork (2023)

Table 1 shows specific biology topics within SS I and SS II biology curriculum that were perceived difficult by SS II students and biology teachers. The result revealed that, both SS II students and biology teachers identified 3 topics to be difficult. These are Nutrition in animals (Students: $M = 3.26$, $SD = 0.70$; Teachers: $M = 2.61$, $SD = 0.91$), Respiratory system (Students: $M = 3.23$, $SD = 0.85$; Teachers: $M = 2.53$, $SD = 0.90$), and Pests and diseases of crops (Students: $M = 3.29$, $SD = 0.84$; Teachers: $M = 2.51$, $SD = 0.88$). These topics have mean scores above 2.5 for both students and teachers, indicating a shared perception of difficulty. However, disparities in perception between SS II students and teachers were evident for 3 topics. Students perceived the cell and its

environment ($M = 2.98$, $SD = 0.86$), Functioning ecosystems ($M = 2.77$, $SD = 1.04$), and Nutrient cycle in nature ($M = 3.17$, $SD = 0.89$) as difficult, whereas teachers found these topics comparatively easy (The cell and its environment: $M = 1.15$, $SD = 0.97$; Functioning ecosystems: $M = 2.05$, $SD = 0.95$; Nutrient cycle in nature: $M = 2.21$, $SD = 1.01$). This revealed a misalignment in perception between SS II students and teachers regarding the difficulty of these specific biology topics.

Research Question Two: Is there difference in the mean ratings of the perceived difficult level of SS I and SS II biology topics between SS II students and biology teachers?

Table 2: Mean and Standard Deviation Statistics on Perceived Difficult Biology Topics between SS II Students and Biology Teachers

Study Groups	N	Mean	Std. Dev.	Mean difference
SS II Students	378	2.71	1.04	1.07
Biology Teacher	48	1.64	0.96	

Result in Table 2 shows that, the mean rating of perceived difficult biology topics of the SS II

Students is 2.71, with a standard deviation of 1.04. While on the other hand, biology teachers have a

lower mean rating of 1.64, with a standard deviation of 0.96. The mean difference between the two groups is 1.07, which indicate, on average, SS II students perceived more biology topics to be difficult compared to how biology teachers perceived them. The standard deviations show some variability within each group, suggesting that there is diversity

in the perceptions of difficulty of biology topics among both students and teachers.

Null Hypothesis One (H₀₁): There is no significant difference in the mean ratings of perceived difficult level of SS I and SS II biology topics between SS II students and biology teachers.

Table 3: T-test Analysis on Mean Ratings of Perceived Difficult Biology Topics between SS II Students and Teachers

Study Groups	N	Mean	Std. Dev.	df	t	p-value	Remark
SS II Students	378	2.71	1.04	424	2.51	0.030	Reject H ₀₁
Biology Teacher	48	1.64	0.96				

p-value < 0.05.

Table 3 shows that mean rating for SS II students is 2.71 with standard deviation of 1.04, while for biology teachers is 2.51. The t-test yielded a significant result ($t = 2.51$, $df = 424$, $p = 0.030$), because the p-value ($p = 0.030$) is less than the significance level of 0.05. The null hypothesis is therefore rejected. This imply that, there is a statistically significant difference in the mean ratings of perceived difficulty of SS I and SS II biology topics between SS II students and biology teachers.

Summary of Major Findings

The following comprised the major findings of the study;

1. Three topics out of 30, namely Nutrition in animals, Respiratory system and, Pests and diseases of crops were perceived as difficult by both SS II students and biology teachers.
2. The SS II students perceived the cell and its environment, Functioning ecosystems, and Nutrient cycle in nature as difficult, whereas teachers find these topics comparatively easy.
3. The observed difference in perceived difficulty levels between the SS II students and biology teachers was substantiated to be statistically significant.

DISCUSSION

The study investigated perceived difficult topics within SS I – SS II biology curriculum in senior secondary school biology curriculum in Zamfara state. The findings revealed consensus in the perceived difficulty of certain topics, which are Nutrition in animals, Respiratory system and, Pests and diseases of crops, with mean scores above 2.5 for both students and teachers. The shared perception of difficulty for these topics might be attributed to the inherent complexity or abstract nature of these topics, requiring a deeper level of understanding of their contents. These shared perceptions aligned with studies of Salleh *et al.*, (2021) in Malaysia where both teachers and students considered Respiration and Nutrition as difficult biology topics. Anidu and

Onah (2020) also found Pests and Diseases of Crops among the topics perceived to be difficult by the majority of preservice biology teachers in Abia State, Nigeria. Also, Haruna (2021) found Pests and Diseases of Crops as one of the five major biology topics which students perceived as difficult among SS II students in Kano State, Nigeria.

The findings of the study also revealed disparities in the perception of difficulty for specific topics. Students found The cell and its environment, Functioning ecosystems, and Nutrient cycle in nature difficult, while teachers perceived them as easy. The differences in perceived difficulty for these topics could stem from variations in teaching methods, comprehension levels, or the relevance assigned to these topics. Students may find these topics challenging due to abstract concepts therein. This discrepancy in perception resonates with the findings of Anidu and Onah (2020), where genetics and evolution were identified as difficult topics by students but were not perceived as such by teachers. Anidu and Onah (2020) attributed this to the possibility that teachers, with a deeper understanding, may struggle to break or simplify the topics for students to comprehend. In contrast, Anidu and Onah (2020) found that preservice biology teachers predominantly perceived the topics of Cell and its environment and Nutrients Cycling as difficult on the senior secondary biology curriculum in Abia State, Nigeria. Consistent with this present study, Edeh and Martha (2020) identified The cell and its Environment as one of the perceived difficult biology topics among secondary school students in Nkanu East, Enugu State, Nigeria, while Haruna (2021) reported a similar perception among SS II students in Kano State, Nigeria, specifically for Nutrient Cycling in Nature.

The misalignment in the perception of the difficulty of some topics suggests a need for targeted instructional strategies that bridge the gap between student experiences and teacher perspectives. Comparing the mean ratings of perceived difficult

biology topics of SS I and SS II curriculum between SS II students and biology teachers, the study revealed a significant difference, indicating that, on average, students perceived certain biology topics as more difficult than their teachers did. The statistically significant difference may be due to systemic issues in the teaching approach, curriculum implementation, or teacher-student interactions during instruction. These findings echo the recommendations of several studies, including Ezechi (2019) in Nigeria, Byukusenge *et al.*, (2022) in Rwanda and NUC (2023), who stressed the importance of teacher training programmes to enhance their efficacy in teaching identified perceived difficult topics.

CONCLUSION

The contention that students and biology teachers perceived certain biology topics as difficult is indisputable. In this study, a common perception emerged among both SS II students and teachers regarding the perceived difficulty of three biology topics out of the 30 listed within SS I – SS II biology curriculum in Zamfara State. These topics are Nutrition in animals, Respiratory system, and Pests and diseases of crops. In addition, SS II students considered topics The cell and its environment, Functioning ecosystems, and Nutrient cycle in nature as difficult, while biology teachers perceived them as easy. Nonetheless, the study revealed significant differences in their shared perceptions, indicating that SS II students found more biology topics difficult compared to the perspective of their biology teachers.

Implications of the Findings for Pedagogy in Biology Education

The findings of the study pointed to the need for tailored pedagogical strategies to address shared and differing perceptions of difficult biology topics among SS II students and teachers in Zamfara State. Topics like Nutrition in animals, Microorganisms, Respiratory system, and Pests and diseases are common challenging biology topics, hence suggest the necessity for innovative teaching methods. Disparities in perception for specific topics indicate a gap in comprehension and call for innovative strategies to bridge this divide. The significant difference in students' and teachers' perspectives highlight potential systemic issues, emphasizes the importance of continuous teacher professional development programmes in improving biology teachers' self-efficacy in teaching challenging topics for students' better learning outcomes in Zamfara State.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made;

1. The Zamfara State Ministry of Education and relevant stakeholders should regularly organize professional development for biology teachers to improve their content and pedagogical skills in teaching challenging topics to foster better alignment with their student perceptions.
2. Biology teachers should adopt more student-centered approaches such as inquiry and discussion methods by tailoring their pedagogical skills in the teaching of topics that students find challenging.
3. Teachers should encourage students to actively participate in class by asking questions and seeking clarification, and also utilize learning resources like textbooks and online materials to reinforce understanding of topics they perceived as difficult.

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