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Lecturers' Perspectives on Difficult Biology Education Courses in Nigerian Colleges of Education

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ABSTRACT

The study examines lecturers' perceptions of challenging courses in the Biology Education curriculum at colleges of Education in Southwest Nigeria. Using a descriptive survey method with 25 lecturers, data were collected through a validated questionnaire (r = 0.74). The results show that more female lecturers (57%) are compared to their male counterparts (43%). The findings also revealed that 14 lecturers held M.Ed./MSc (Ed), 6 had Ph.D., while 3 possessed B.Ed/BSc (Ed). The data further indicated that lecturers with 1 to 3 years and 4 to 6 years of experience were more numerous. The study identified 14 courses in the NCE Biology Education curriculum that lecturers found difficult. Courses such as Viruses, Bacteria, and Lower Plants (79.2%), Diversity of Chordates (78.2%), and Genetics (69.1%) were perceived as the most challenging. The research concludes that lecturers at the College of Education consider some courses they teach from NCE 1 to 3 as difficult. Recommendations include increased use of demonstrations to facilitate understanding of abstract concepts.

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1. INTRODUCTION

Learning biology can be challenging for students due to the abstract nature of the topics, which are often beyond their everyday experiences and require imagination. To address this, the curriculum should be designed with a focus on student-centred approaches. This will help 21st-century individuals develop their creativity, critical thinking, ability to challenge biases, collaborate in social settings, advocate for causes, propose solutions, specialise in a particular field, uphold universal values, demonstrate responsibility, independence, problem-solving skills, readiness for life, collaboration, success in dynamic environments, and embrace lifelong learning. To prepare individuals for the demands of the working and social world, it is crucial to regularly update the curriculum content in response to global changes and societal expectations. Seeking input

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from subject matter experts is essential for this purpose and necessitates seeking input from subject matter experts [1], [2], [3].

Ensuring a curriculum can overcome potential challenges is crucial for educational success. It is essential to consider the instructors' perspectives, particularly in the context of the biology education curriculum. The recent updates to the curriculum were specifically designed to enhance students' biological literacy, critical thinking skills, and ethical responsibility. Research in this area has uncovered valuable insights into teacher qualifications and the challenges they face in practice. These studies provide important guidance for improving biology education, offering innovative solutions to enhance student learning. By focusing on conceptual understanding and effective teaching methods, we can ensure that students are well-prepared to tackle the complexities of biodiversity and contribute meaningfully to biology and science education.

Science education in the present day is saddled with the responsibility of advancing any country's progress within the various life aspects [4], [5]. It is pertinent to say that science development and science education development play an important role in developing a country [6], [7]. The foundation for the nation's ability to compete with other countries hugely depends on its scientific literacy and grasp of diverse scientific concepts [8]. With this responsibility, it becomes expedient for both the government and stakeholders to produce high-quality science educators and scientists to educate the students. To salvage this, the country must have a good educational system to achieve the objectives of science education in the modern era. The science education program is comprised of various sub-programs, among which is biology education, which is one of the key programs in the development of health, livestock, agriculture, and drugs.

At the college of education (CoE) level, the School of Science houses the biology education department. It has students studying biology and a second teaching subject that will lead to a National Certificate in Education (NCE). One objective of the biology education programme at the CoE level is to develop knowledge in new areas, handle daily situations, and pursue a successful career in teaching biology at the Federal Ministry of Education (FME) [9]. This means that all concepts taught at the college of education level are expected to meet the objectives of the minimum standard. Despite the popularity of biology, studies have shown that many students often perform poorly in this subject [10], which forms the basis for this study.

The lecturer's view on difficult concepts relates to the beliefs, feelings, and thoughts an individual has about a person, situation, or event perceived as difficult or not. In education, one’s opinion on a challenging concept concerns the ease or difficulty of performing a specific task or activity [11]. Lecturers' opinions on difficult courses involve identifying the various courses they teach as being challenging at different levels within the Biology Education Programme. The difficulty of these courses could be due to factors such as their abstract nature, poor student performance over the years, the complexity of the content, and so on. These factors may serve as criteria for lecturers when categorising courses as difficult. However, most studies have examined students' perceptions of difficult courses in higher institutions and secondary schools, both nationally and internationally. Many of these studies centre on students' perceptions of courses in biology education [10],

[11], [12], [13]. A study by Usman et al. [14] investigated the perception of difficult topics by pre-service teachers in mathematics at colleges of education in Niger State, Nigeria. Their research indicates that pre-service teachers found 9 topics to be difficult, while lecturers identified 3 courses as challenging to teach. This suggests that lecturers should employ various teaching methods to help students better understand these concepts.

Scholars like Ní Shé et al. [15] reported a synergy between lecturers and students regarding difficult topics in mathematics; however, this was not consistent across all topics for both groups. In the biological field, scholars have examined various challenging topics. Among these, Salleh et al. [16] reported that students find topics such as nutrition, cell division, and chemical composition in cells difficult, while teachers considered cell division and nutrition particularly challenging. Another study conducted by Ismail and Matazu [17] showed that, among 30 biology topics assessed, both SS2 students and their teachers identified nutrition in animals, pests, and controls, and the respiratory system as difficult. However, there appears to be a disparity between SS2 students and their teachers for some topics, such as cells and their environment, the nutrition cycle, and functioning ecosystems, which students found difficult, whereas teachers regarded them as easier. Anidu and Onah [18] reported that cell and their environment, functioning ecosystems, microorganisms around us, unicellular organisms, invertebrates, nutrient cycling, ecological management, pests and diseases of crops, reproductive systems in vertebrates, regulation of the internal environment, nervous coordination, genetics, variation, and evolution were perceived as difficult by pre-service teachers studying Biology education at two universities.

In addition, Edeh and Martha's [19] research showed that genetics, evolution, and the cell and its environment were identified as difficult topics by students. In addition, Ezechi's [20] study showed that SSII students perceived 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 as difficult topics for students. A study by Aniaku and Nwankwo [21] showed that students perceived these topics as the most difficult, including genetics, mitosis and meiosis, nervous coordination, regulation of the internal environment, and supporting tissues in plants and animals, amongst others. Kojigili and Mohammed's [22] research shows that some biology teachers had some topics that they felt were difficult to teach. Research by Moses [23] conducted in Zambia shows that high school students and teachers found Mendelian genetics, mitosis and meiosis, genes and chromosomes, DNA synthesis, skeletal system, and evolution to be difficult. A study by Byukusenge et al. [24] showed that genetic engineering, gene technology, cell biology, genetics, protein synthesis, and DNA replication revealed that teachers perceived these topics to be difficult in Biology in Rwanda. A study by Frederick-Jonah and Tobi [25] shows that SS3 students found the cell division process difficult. In contrast, Haruna [26] studies revealed that SS2 students found conservation of natural resources, ecological management, nutrient cycling in nature, pests, and diseases of crops difficult in Kano State.

These scholars have established that students find various topics in Biology to be difficult, and teachers have found some of the topics to be aligned with those of the

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students. Therefore, it is important to get the lecturer's opinion on the difficult biology concepts at the higher institution, too. A study reported that many students consider science, including Biology, as difficult at all levels of education [27]. This condition has been researched at the secondary school and university levels by different scholars in the field of science, respectively. However, it is also important to assess lecturers' opinions on the difficult courses they teach at the college of education level. This will help correlate the results obtained from the various research studies, indicating that biology is perceived as difficult by both students and the teachers who teach biology at the secondary school level. Based on these, the study sought to investigate lecturers' opinions on the difficult courses offered at colleges of education in southwest Nigeria.

Statement of the Problem

Several studies have shown various topics in Biology by students in secondary school and pre-service teachers at the university level. Scholars engaged in the perceived difficult topics in Biology and various topics were identified, some including cell division, genetics, nutrition, etc. This study intends to get the perception of students based on the difficult courses they offer at higher institutions concerning biology education programmes at the College of Education level. Based on the reviewed studies, lecturers' opinions on the difficult courses offered at schools have not been greatly established in the literature. The lecturer's opinion on the difficulty level of the courses they teach is important because they teach the pre-service teachers who will, in turn, teach, and these lecturers can change their methods to improve the understanding and performance in these courses. This study intends to align students' and teachers' literature on the difficult courses and concepts offered at higher institutions with those topics researched earlier in secondary schools. The study, therefore, focuses on the lecturer's opinion on the difficult courses in the biology education programme at the college of education level in southwest Nigeria.

Research Questions

1. What is the gender of Lecturers in the Biology Education Department?
2. What are the lecturer's qualifications in the Biology Education Department?
3. What are the lecturer's years of Experience in the Biology Education Department?
4. Which courses in the Biology Education Curriculum for NCE 1 do lecturers consider difficult?
5. Which courses in the Biology Education Curriculum for NCE 2 do lecturers consider difficult?
6. Which courses in the Biology Education Curriculum for NCE 3 do lecturers consider difficult?

2. METHOD

Design

The study employed a descriptive survey research design, which involves the use of questionnaires and does not require any manipulation.

Population and Sampling Technique

Purposive sampling was used to select five colleges of Education in Southwest Nigeria. The reason for the selection was to ensure that all colleges of education were of comparable standard and owned by the government, thereby reflecting the equipment, qualifications, and classroom availability to obtain uniform responses. The population comprises all lecturers in the science programme at colleges of education in the southwest who teach Biology Education. All the available lecturers teaching Biology Education at the school of science or schools of secondary education in southwest Nigeria were used for the study. A total of 23 lecturers were sampled from the five selected colleges of education to make up the sample for the study.

Instrumentation

The instrument used for data collection was the Lecturer Course Difficulty Questionnaire (LCDQ). The questionnaire was developed to collect lecturers' perspectives on the difficulty level of the courses they teach at the College of Education from NCE 1 to NCE 3 in the Biology Education Department. This questionnaire was divided into two parts. Part A collects information on lecturers' biodata, such as lecturers' Gender, Years of experience, and Level of qualification. Part B contains items that show different biology courses from NCE 1 to NCE 3, and how difficult each course is based on the following:

1. Not difficult,
2. Difficult,
3. Highly difficult and
4. Extremely difficult.

The validity and reliability of LCDQ were analysed using a test-retest as the reliability measure, and the index was 0.74.

Procedure for Data Collection

The data collection lasted four weeks. The first week was used to obtain the lecturer's approval to respond to the questionnaire. Two weeks were allocated for respondents to complete the questionnaire, and the final week was dedicated to collecting the questionnaires from the lecturers, providing ample time for them to respond.

Data Analysis

The data collected were analysed using pie charts, bar charts, and percentages.

3. RESULTS AND DISCUSSION

3.1. Results

Research Question 1: What is the gender of Lecturers in the Biology Education Department?

This figure reveals the lecturer's gender, indicating the gender of the academic staff.

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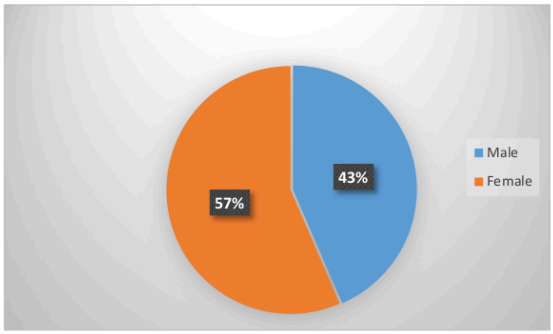

Figure 1. The lecturers' gender

Figure 1 indicates the lecturers' gender, with male lecturers having 43% of the lecturers' population, and 57% of the lecturers were female. This shows that in the lecturer population, we have more female lecturers than male lecturers teaching biology at the College of Education in the West.

Research Question 2: What are the lecturer's qualifications in the Biology Education Department?

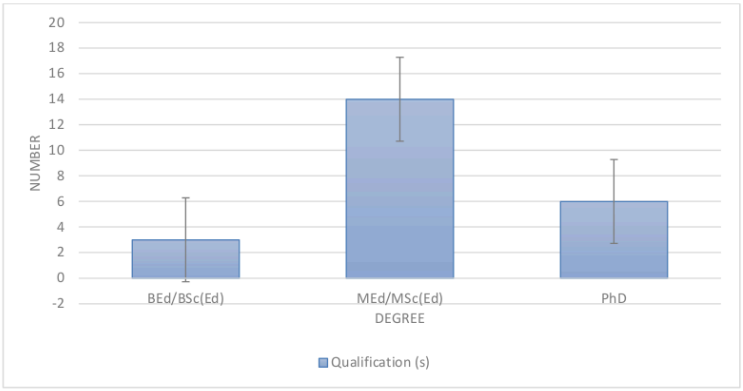

Figure 2. The lecturers' Qualifications

Figure 2 indicates lecturers' qualifications in Colleges of Education in Southwest Nigeria: 3 of the lecturers have a B.Ed/B.Sc (Ed) degrees, 14 of the lecturers have M. Ed/M Sc (Ed), and finally, 6 of the lecturers have a PhD.

Research Question 3: What are the lecturer's years of Experience in the Biology Education Department?

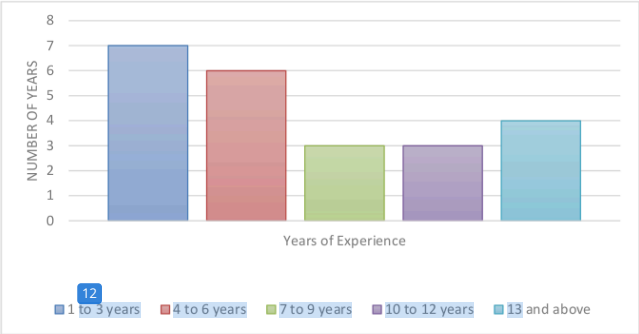

Figure 3. The Lecturers' Years of Experience

Figure 3 shows lecturers' years of experience for colleges of education: 7 lecturers had 1 to 3 years, six lecturers had 4 to 6 years, three lecturers had 7 to 9 years, three lecturers had 10 to 12 years, and four lecturers had 13 years and above experience as lecturers.

Research Question 1: What courses in the Biology Education Curriculum for NCE 1 are considered difficult by lecturers?

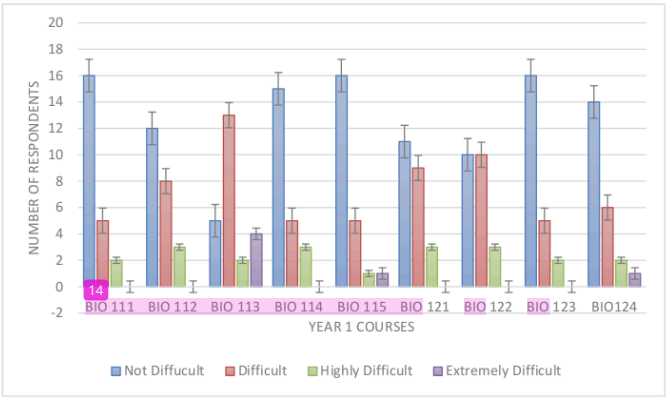

Figure 4. The courses in the Biology Education Curriculum for NCE 1 are considered to be difficult by lecturers

Figure 4 indicates the lecturers' opinion on the difficulty level of NCE I courses at colleges of education. 16 Lecturers perceived BIO 111 as not difficult, five lecturers perceived it as

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difficult, and two lecturers perceived it as highly difficult. For BIO 112, 12 lecturers perceived it as not difficult, 8 perceived it as difficult, and 3 perceived it as highly difficult. For BIO 113, 5 perceived it as not difficult, 13 perceived it as difficult, 2 perceived it as highly difficult, and 4 perceived it as extremely difficult. For BIO 114, 15 perceived it as not difficult, 5 perceived it as difficult, and 3 perceived it as highly difficult. For BIO 115, 16 perceived it as not difficult, 5 perceived it as difficult, 1 perceived it as highly difficult, and 1 perceived it as extremely difficult. For BIO 121, 11 perceived it as not difficult, 9 perceived it as difficult, and 3 perceived it as highly difficult. For BIO 122, 10 perceived it as not difficult, 10 perceived it as difficult, and 3 perceived it as highly difficult. For BIO 123, 16 perceived it as not difficult, 5 perceived it as difficult, and 2 perceived it as highly difficult. For BIO 124, 14 perceived it as not difficult, 6 perceived it as difficult, 2 perceived it as highly difficult, and 1 perceived it as extremely difficult.

Research Question 2: What courses in the Biology Education Curriculum for NCE 2 are considered difficult by lecturers?

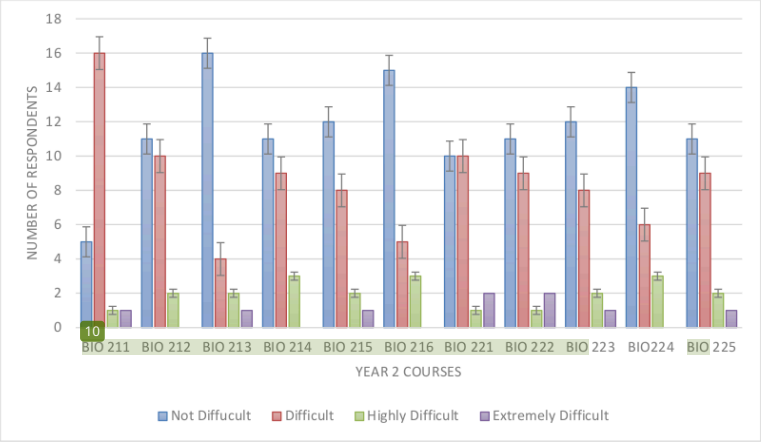

Figure 5. The courses in the Biology Education Curriculum for NCE 2 are considered to be difficult by lecturers

Figure 5 indicates the lecturers' opinions on the difficulty level of NCE II courses at colleges of education. Five lecturers perceived BIO 211 as not being a difficult course, 16 perceived it to be difficult, 1 perceived it to be highly difficult, and 1 perceived it to be extremely difficult. 11 perceived BIO 212 as not difficult, 10 said it was difficult, and 2 perceived it as highly difficult. 16 perceived BIO 213 as not difficult, 4 perceived it as difficult, 2 perceived it as highly difficult, while 1 perceived it as extremely difficult. 11 lecturers perceived BIO 214 as not difficult, 9 perceived it as difficult, and 3 perceived it as highly difficult. Twelve lecturers perceived BIO 215 as not difficult, 8 perceived it as

difficult, 2 perceived it as highly difficult, and 1 perceived it as extremely difficult. Fifteen lecturers perceived BIO216 as not difficult, 5 perceived it as difficult, and 3 perceived it as highly difficult. Ten lecturers perceived BIO 221 as not difficult, 10 perceived it as difficult, 1 perceived it as highly difficult, while 2 perceived it as extremely difficult. 11 lecturers perceived BIO 222 as not difficult, 9 perceived it as difficult, 1 perceived it as highly difficult.

In contrast, 2 perceived it as extremely difficult. Twelve perceived BIO 223 as not difficult, 8 perceived it as difficult, 2 perceived it as highly difficult, and 1 perceived it as extremely difficult. Fourteen lecturers perceived BIO 224 as not difficult, 6 perceived it as difficult, while 3 perceived it as highly difficult. 11 lecturers perceived BIO 225 as not difficult, nine lecturers perceived it as difficult, 2 perceived it as highly difficult, and 1 perceived it as extremely difficult.

Research question 3: What courses in the Biology Education Curriculum for NCE 1 are considered difficult by lecturers?

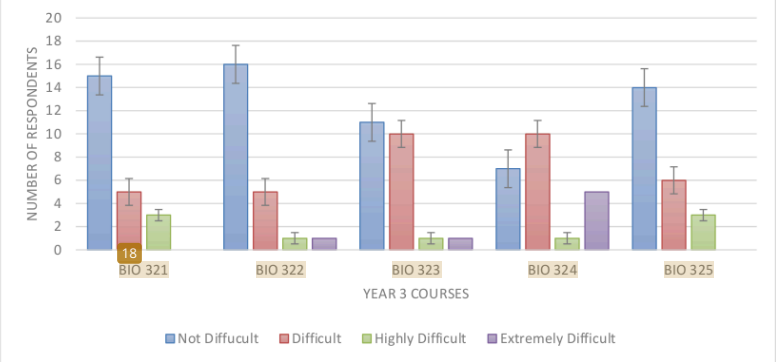

Figure 6. The courses in the Biology Education Curriculum for NCE 1 are considered to be difficult by lecturers

Figure 6 indicates the level of lecturers' perceived view of the difficulty level of NCE III courses at colleges of education. Fifteen lecturers perceived BIO 321 as not to be difficult, five as difficult, and three as highly difficult. For BIO 322, 16 lecturers perceived it as not difficult, 5 perceived it as difficult, one as highly difficult, and one as extremely difficult. BIO 323 was perceived as not difficult by 11 lecturers, 10 as difficult, one as highly difficult, and one as extremely difficult. BIO 324 was perceived as not difficult by 7, 10 as difficult, one as highly difficult, and five as extremely difficult. BIO 325 was perceived as not difficult by 14, 6 as difficult, and three as highly difficult.

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3.2. Discussion

The finding indicates that there are more female than male lecturers; female lecturers constituted 57 %, while 43% were men. The results further indicated that 14 of the lecturers had a master's degree, while 4 had a PhD, and this shows that most of the lecturers possess a postgraduate degree. It further shows that most of the lecturers are experienced, as a high number of them have taught for more than 5 years. The findings indicate that lecturers who handle NCE 1 to 3 have almost equal perceptions of the difficulty level of the courses at that level. This means that based on the curriculum content and the pre-service teachers' performance in the courses, the lecturers have diverse perceptions of the difficulty level of the courses taught by them. Their diverse perspective lean towards difficult concepts in some courses at the NCE 1 to NCE 3 levels. The finding is in line with Rutten et al. [28], which showed that teachers leaned into difficult topics in an inquiry community to construct their understanding of difficult topics. This means lecturers also have uncertainty when teaching difficult concepts, and some people decline taking difficult concepts. The findings also align with Ní Shé et al. [15] results that revealed that there was an agreement between students and lecturers on certain problematic topics in mathematics, but it was not uniform across all topics. This means that lecturers also perceive some topics to be difficult, as well as how the students who offer them. The findings further corroborate the results by Usman et al. [14] that revealed that 3 topics in the mathematics curriculum were difficult to teach by lecturers, while 9 topics were perceived as difficult to comprehend by pre-service mathematics teachers. In a study by Sözbilir [29], the findings indicated that lecturers and students agree on the learning difficulties they face in learning physical chemistry.

The findings corroborate the findings in other fields of study where the lecturers perceived some topics and courses to be difficult to teach and learn by pre-service teachers and students of Biology. It is important to note that studies on students' perception of difficult concepts in Biology have already been researched extensively, but the lecturers' or teachers' perception has received little or no research in the past. Therefore, this study has breached the gap in research to identify the various concepts/courses lecturers perceived as difficult based on students' performance in the courses or based on the nature of the content of the courses or concepts.

However, lecturers' opinions on difficult courses involve lecturers identifying the various courses they teach as being difficult, which may be based on the content of the courses. Other lecturers may identify these courses based on the abstractness of the content of the course, which is difficult to teach and carry out practically. Others may identify these courses as difficult based on the student's performance in these courses over the years, with a lot of poor performances recorded in the past. Based on the result, it could be deduced that lecturers perceived some courses at the NCE 1 to 3 level as difficult. This can be a result of the fact that these courses have had poor performance over the years, leading them to believe that the courses are difficult.

4. CONCLUSION

The study sought to investigate lecturers' perspectives on the difficult concept of the Biology Education programme at Nigerian Colleges of Education. The findings indicated that lecturers at the Nigerian Colleges of Education perceive that some of the courses they teach from NCE 1 to 3 are difficult. The following recommendations were made:

a. Lecturers should teach these courses with enough practical and demonstration to aid understanding of abstract concepts in those courses.
b. Lecturers who are experts in those topics/concepts should be given these courses to teach so as to help pre-service teachers understand the concepts better.
c. Lecturers should not look at the performance of students to conclude that these courses are difficult, thereby reducing the morale of the student teachers.

Suggestions for further research

The research should be expanded to the universities and colleges of education in other parts of Nigeria and other countries globally.

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Appendix

Table 1. Biology Education Curriculum Course Codes and their Titles

S/N	Course Code	Course Title
1.	BIO 111	Basic Principles of Biology
2.	BIO 112	Cell Biology
3	BIO 113	Viruses, Bacteria, and Lower Plants
4	BIO 114	Biological Practical I
5	BIO 115	Ecology
6	BIO 121	Diversity of Invertebrates
7	BIO 122	Diversity, Anatomy, and Histology of Spermatophytes
8	BIO 123	Biology Methods
9	BIO 124	Biology Practical II
10	BIO 211	Diversity of Chordates
11	BIO 212	Research Methods and Biometry
12	BIO 213	Population Education
13	BIO 214	Plant Pathology
14	BIO 215	Animal Histology
15	BIO 216	Biology Practical III
16	BIO 221	Plant Physiology
17	BIO 222	Vertebrate Anatomy and Physiology
18	BIO 223	Embryology
19	BIO 224	Biology Practical IV
20	BIO 225	Evolution
21	BIO 321	Laboratory Management
22	BIO 322	Applied Biology
23	BIO 323	Introductory Parasitology
24	BIO 324	Genetics
25	BIO 325	Biology Practical V

Table 1 shows the course code and titles for all the courses offered by NCE students in the biology programme from NCE 1 to 3.

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