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Gender Differences in Academic Performance in Biology Among Senior Secondary School Students in Selected Secondary Schools in Fune Local Government Area, Yobe State

Mohammed Abubakar Jado; Jacob Dabo Itse; & Muhammad Hamma
Department of Science Education, Faculty of Education, Sa'adu Zungur University Gadau
Corresponding Author: jadoabbaty@gmail.com
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Abstract

Biology occupies a strategic position in the Nigerian secondary school curriculum because it provides foundational knowledge required for careers in medicine, agriculture, nursing, environmental sciences, and other science-related disciplines. Despite its importance, concerns continue to emerge regarding students' academic achievement in biology, particularly in relation to gender disparities. This study investigated gender differences in academic performance in biology among senior secondary school students in selected secondary schools in Fune Local Government Area of Yobe State, Nigeria. A descriptive comparative research design was adopted for the study. The population comprised Senior Secondary School II (SS II) students offering biology in public secondary schools within the study area. A sample of 218 students consisting of 93 male and 125 female students was selected through multistage sampling procedures. Data were collected using a researcher-developed Biology Achievement Test (BAT), which was validated by specialists in biology education and tested for reliability using the test–retest method. A reliability coefficient of 0.82 was obtained, indicating that the instrument was reliable for the study. Descriptive statistics such as mean and standard deviation were used to answer the research questions, while an independent sample t-test was used to test the hypothesis at the 0.05 level of significance. The findings revealed that both male and female students demonstrated satisfactory performance in biology. Although slight differences existed in the performance distribution of the two groups, the difference in

their mean scores was not statistically significant. The study therefore concluded that gender does not significantly influence students' academic performance in biology in the study area. The study recommended the adoption of learner-centered teaching strategies, provision of adequate laboratory facilities, and promotion of equal learning opportunities for both male and female students.

Keyword: Academic Performance, Biology Education, Gender difference, Secondary School Students, Science Education.

Introduction

Biology is one of the major science subjects offered at the senior secondary school level in Nigeria and plays a significant role in promoting scientific literacy and national development. The subject equips learners with relevant knowledge and practical skills related to living organisms, environmental sustainability, human health, agriculture, and biotechnology (Federal Ministry of Education [FME], 2020). Biology also serves as a prerequisite for admission into many science-oriented courses in tertiary institutions, including medicine, pharmacy, nursing, agriculture, and environmental sciences (UNESCO, 2021). As a result, students' academic achievement in biology has continued to receive considerable attention from educators, researchers, policymakers, and parents due to its importance in educational advancement and national development (WAEC, 2022).

In recent years, concerns have been raised regarding the level of students' performance in biology in both internal and external examinations. Reports from examination bodies such as the West African Examinations Council (WAEC) and the National Examinations Council (NECO) indicate fluctuating patterns of achievement among secondary school students in biology. Several factors have been associated with poor or inconsistent performance in the subject. These factors include inadequate laboratory facilities, ineffective teaching methods, insufficient instructional materials, poor study habits, overcrowded classrooms, and limited exposure to practical activities.

Among the numerous factors associated with students' academic performance in science subjects, gender has remained an important issue in educational research. Researchers have continued to examine whether significant differences exist between male and female students in their achievement in biology and other science-related disciplines. Some studies have reported that female students tend to perform better in biology because of their greater interest in life sciences and health-related subjects, while other studies found no significant difference or reported slight male superiority depending on the learning environment, teaching methods, and assessment techniques employed (Aina & Akintunde, 2022; Ezeudu & Obi, 2021). The issue of gender differences in science education has continued to attract global attention due to concerns about equal participation, access, and achievement

opportunities for both male and female students in science-related fields (UNESCO, 2021).

The issue of gender differences in science education has attracted considerable global attention because of concerns regarding equal participation and achievement opportunities for both male and female students. Over the years, educational reforms and gender equity initiatives have contributed to increased female participation in science education, particularly in biology, which is often associated with human health and life sciences (UNESCO, 2021). Despite these improvements, factors such as socio-cultural expectations, parental influence, school environment, teacher attitudes, and classroom interactions may continue to affect students' academic experiences and performance differently across gender groups (Okafor & Nwankwo, 2023; Adamu & Bello, 2022).

In Yobe State, particularly in Fune Local Government Area, biology remains one of the most commonly offered science subjects in secondary schools. Despite its popularity, concerns persist regarding students' performance in the subject. Teachers, parents, and educational stakeholders have expressed different opinions regarding whether gender contributes to variations in students' achievement in biology. However, many of these opinions are based on assumptions rather than empirical evidence.

It is therefore necessary to investigate whether significant differences exist between male and female students' academic performance in biology within the study area. Findings from this study will provide useful information for teachers, school administrators, curriculum planners, and policymakers in designing strategies aimed at improving students' achievement and promoting gender equity in science education.

Statement of the Problem

Academic performance in biology among senior secondary school students remains an important issue in the Nigerian educational system. Biology is a core science subject required for many professional and science-oriented courses at the tertiary level. However, reports from examination bodies over the years have revealed fluctuating levels of achievement among students, thereby raising concerns about the quality of science education and students' preparedness for higher education and science-related careers (WAEC, 2022; NECO, 2023). Several studies have also associated poor or inconsistent performance in biology with factors such as inadequate laboratory facilities, ineffective teaching methods, poor learning environments, and limited exposure to practical activities (Yusuf et al., 2023; Ogunleye & Aina, 2021).

In Fune Local Government Area of Yobe State, variations have been observed in students' academic performance in biology across schools and examination periods. While some educators believe that female students perform better in biology because of their interest in life sciences and health-related subjects, others argue that male students tend to achieve better outcomes due to greater participation in practical and laboratory-based activities. These assumptions, however, have not been adequately supported by empirical evidence within the local context (Adamu & Bello, 2022).

The absence of sufficient local evidence on gender differences in biology achievement creates uncertainty for educators, school administrators, and policymakers who seek to improve students' performance in science subjects. Without reliable and context-based research findings, interventions aimed at improving biology achievement may fail to address the actual factors influencing students' academic performance (Okafor & Nwankwo, 2023).

The problem addressed in this study, therefore, is the need to determine whether significant differences exist between the academic performance of male and female students in biology in selected senior secondary schools in Fune Local Government Area of Yobe State.

Objectives of the Study

The main objective of this study was to examine gender differences in academic performance in biology among senior secondary school students in selected secondary schools in Fune Local Government Area of Yobe State.

The specific objectives were to:

1. Determine the level of academic performance of male students in biology;
2. determine the level of academic performance of female students in biology; and
3. Examine whether a significant difference exists between the academic performance of male and female students in biology.

Research Questions

The following research questions guided the study:

1. What is the level of academic performance of male students in biology in selected senior secondary schools in Fune Local Government Area?
2. What is the level of academic performance of female students in biology in selected senior secondary schools in Fune Local Government Area?
3. Is there a significant difference between the academic performance of male and female students in biology?

Research Hypothesis

The following null hypothesis was tested at the 0.05 level of significance:

H01: There is no significant difference between the academic performance of male and female students in biology in selected senior secondary schools in Fune Local Government Area of Yobe State.

Research Design

The study adopted a descriptive comparative research design. The design was considered suitable because it enabled the researcher to compare the academic performance of male and female students in biology without manipulating any variable. The design also allowed the researcher to examine naturally occurring differences in achievement between the two groups.

Area of the Study

The study was conducted in Fune Local Government Area of Yobe State, Nigeria. The area consists of both urban and rural communities with several public senior secondary schools offering biology as a science subject. The area was selected because of concerns regarding students' academic performance in science subjects and the need to generate empirical evidence relating to gender and biology achievement.

Population of the Study

The population of the study consisted of all Senior Secondary School II (SS II) students offering biology in public senior secondary schools in Fune Local Government Area. SS II students were considered appropriate because they had already acquired substantial exposure to biology instruction.

Sample and Sampling Technique

A multistage sampling procedure was employed for the study. In the first stage, selected secondary schools were chosen through simple random sampling. In the second stage, students were stratified according to gender to ensure adequate representation of both male and female students. Finally, simple random sampling was used to select the individual participants from the class registers.

A total of 218 students participated in the study, comprising 93 male students and 125 female students.

Instrument for Data Collection

Data were collected using a researcher-developed Biology Achievement Test (BAT). The instrument consisted of multiple-choice questions with four response options labeled A–D. The items were drawn from topics already covered in the SS II biology curriculum, including ecology, nutrition, reproduction, and cell biology.

Each correct response attracted one mark, while incorrect responses attracted zero marks. The total score obtained by each student represented his or her level of academic achievement in biology.

Validity of the Instrument

To ensure validity, copies of the instrument were presented to experts in biology education and educational measurement. The experts examined the items for clarity, relevance, appropriateness, and coverage of the study objectives. Corrections and suggestions provided by the validators were incorporated before the final administration of the instrument.

Reliability of the Instrument

The reliability of the Biology Achievement Test was established using the test–retest method. The instrument was administered to students outside the study sample on two different

occasions separated by a two-week interval. The scores obtained from both administrations were correlated using Pearson Product Moment Correlation. A reliability coefficient of 0.82 was obtained, indicating that the instrument was reliable for the study.

Procedure for Data Collection

Permission to conduct the study was obtained from the principals of the selected schools. The researcher personally administered the instrument to the students with the assistance of classroom teachers. Uniform instructions were provided to all participants to ensure consistency during the administration process. Completed answer scripts were collected immediately after the exercise.

Method of Data Analysis

The data collected were analyzed using descriptive and inferential statistics. Mean and standard deviation were used to answer the research questions, while an independent sample t-test was used to test the hypothesis at the 0.05 level of significance.

Research Question One

What is the level of academic performance of male students in biology in selected senior secondary schools in Fune Local Government Area?

Table 1: Academic Performance of Male Students in Biology (n = 93)

Grade	Frequency	Percentage (%)
A1	1	1.1
B3	40	43.0
C4	15	16.1
C5	5	5.4
C6	15	16.1
D7	4	4.3
E8	8	8.6
F9	5	5.4
Total	93	100

Interpretation

The findings in Table 1 indicate that male students demonstrated satisfactory academic performance in biology. A substantial proportion of the students obtained grades within the credit category, particularly in grade B3. This suggests that many of the male students possessed adequate understanding of biology concepts taught in school. Only a few students recorded failure grades, indicating that the overall performance of male students could be regarded as average to above average.

Research Question Two

What is the level of academic performance of female students in biology in selected senior secondary schools in Fune Local Government Area?

Table 2: Academic Performance of Female Students in Biology (n = 125)

Grade	Frequency	Percentage (%)
A1	6	4.8
B3	45	36.0
C4	20	16.0
C5	20	16.0
C6	15	12.0
D7	4	3.2
E8	10	8.0
F9	5	4.0
Total	125	100

Interpretation

Table 2 reveals that female students also demonstrated satisfactory academic performance in biology. Most of the female students obtained grades within the credit categories, especially B3, C4, and C5. The relatively low proportion of failure grades indicates that many female students were able to understand and apply biology concepts effectively. The findings therefore suggest that female students performed reasonably well in biology.

Research Question Three

Is there a significant difference between the academic performance of male and female students in biology?

Table 3: Independent Sample t-test Comparing Male and Female Students' Academic Performance in Biology

Variable	Gender	N	Mean	SD	T	df	p-value
Academic Performance	Male	93	5.76	1.45	0.68	216	>0.05
	Female	125	5.62	1.52			

Interpretation

An independent sample t-test was conducted to compare the academic performance of male and female students in biology. The result showed that there was no statistically significant difference between male students (M = 5.76, SD = 1.45) and female students (M = 5.62, SD = 1.52), $t(216) = 0.68$, $p > 0.05$. Therefore, the null hypothesis was accepted, indicating that gender does not significantly influence students' academic performance in biology in the study area.

Summary of Findings

The major findings of the study show that

1. Male students demonstrated satisfactory academic performance in biology, with many obtaining credit-level grades.
2. Female students also recorded satisfactory performance in biology.
3. Both male and female students showed comparable achievement patterns in biology.
4. There was no statistically significant difference between the academic performance of male and female students in biology.

DISCUSSION OF FINDINGS

The findings of the study revealed that male students demonstrated satisfactory academic performance in biology. Many of the male students obtained credit-level grades, suggesting that they possessed adequate understanding of biology concepts taught at the senior secondary school level. This finding may be associated with exposure to classroom instruction, participation in practical activities, and regular assessment practices. The finding is consistent with the study conducted by Ezeudu and Obi (2021), who reported that male students performed reasonably well in science subjects when exposed to supportive learning environments and effective instructional strategies. Similarly, Yusuf et al. (2023) observed that students' performance in biology improves significantly when teachers adopt practical-oriented teaching methods and active classroom engagement.

The study also revealed that female students performed satisfactorily in biology. The relatively low failure rate among female students indicates that they were capable of understanding and applying biological concepts effectively. The findings further suggest that female students were not academically disadvantaged in biology within the study area. This finding agrees with Aina and Akintunde (2022), who found that female students often demonstrate strong performance in biology due to their interest in life sciences and health-related subjects. The finding also supports the report of UNESCO (2021), which emphasized that increased female participation in science education and gender equity initiatives have contributed positively to female students' achievement in biology and other science subjects.

One of the major findings of the study was that there was no statistically significant difference between the academic performance of male and female students in biology. Although slight variations were observed in the distribution of scores, the inferential analysis showed that the differences were not statistically significant. This finding suggests that gender alone may not determine students' academic success in biology when both groups are exposed to similar instructional conditions and learning opportunities. The finding is in agreement with Okafor and Nwankwo (2023), who reported that male and female students achieved comparable outcomes in science subjects when exposed to similar teaching methods and school environments. The finding also supports the study of Musa, Ibrahim, and Mohammed (2024), which concluded that gender differences in biology achievement are gradually diminishing due to improved access to education and inclusive classroom practices.

The findings support the view that students' academic achievement in biology may depend more on instructional quality, learning resources, study habits, and school environment than on gender differences. This position is supported by Adamu and Bello (2022), who argued that effective teaching strategies, availability of instructional materials, and supportive learning environments play greater roles in determining students' academic performance in science subjects than gender-related factors.

CONCLUSION

The study examined gender differences in academic performance in biology among senior secondary school students in selected secondary schools in Fune Local Government Area of Yobe State. The findings revealed that both male and female students demonstrated satisfactory academic achievement in biology. Although minor variations were observed in their performance patterns, the differences were not statistically significant.

The study therefore concludes that gender does not significantly influence students' academic performance in biology in the study area. Rather, students' achievement may be influenced more strongly by factors such as quality of teaching, availability of instructional materials, and the learning environment.

RECOMMENDATIONS

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

1. Biology teachers should adopt learner-centered teaching methods that actively involve both male and female students during classroom instruction and practical activities.
2. School administrators should provide adequate laboratory facilities and instructional materials to enhance effective teaching and learning of biology.
3. Educational authorities should organize regular training programmes and workshops for biology teachers on innovative teaching strategies and assessment practices.
4. Teachers should encourage equal participation of male and female students in classroom discussions and laboratory activities.
5. Future studies should investigate other variables that may influence students' academic performance in biology, such as teaching methods, parental background, school environment, and students' attitudes toward science.

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