CORRELATION STUDY OF ATTITUDE AND ACADEMIC PERFORMANCE IN BIOLOGY AMONG SECONDARY SCHOOL STUDENTS IN LERE, KADUNA STATE

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Abstract

The study explored the correlation between attitude and academic performance in Biology among secondary school students in Lere, Kaduna State. The study was guided by two objectives, two research questions and two null hypotheses. A mixed method consisting of descriptive survey and ex-post facto research designs was adopted for the study. From a total population of twenty thousand, one hundred and fifty-nine public secondary school students, the sample of three hundred and seventy-seven biology students were selected using random sampling techniques. Data collection was done using a questionnaire titled "Students Attitude towards Academic Performance in Biology Questionnaire (SAABQ)", which was validated by three experienced science educators. To determine the reliability of the instrument, it was pilot tested via split-half method and a Cronbach co-efficient value of 0.78 was derived. Data analysis employed mean and standard deviation for the research questions and PPMC and t-test for the null hypotheses. The findings indicate a significant positive relationship between attitude and performance in biology among secondary school students in Lere, Kaduna State ($r = 0.61$; $P = 0.02 < 0.05$). Additionally, there was a significant difference in the attitude of male and female secondary school students towards biology ($t = 0.13$; $P = 0.02 < 0.05$). Based on the results, it was recommended that Kaduna State Government, Lere LGA Education Authority and biology teachers should establish targeted interventions to address the underlying factors influencing students' attitude towards the subject.

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Introduction

Biology is considered a fundamental science subject taught in secondary schools in Nigeria, serving as the foundation for exploring life and its relationships with the environment through scientific inquiry (Tibi et al., 2023). Rooted in the Greek words "Bios" meaning life and "logy" signifying study, the term "Biology" encapsulates the scientific exploration of living organisms and their processes (Ozoarinze, 2018). Maharana et al., (2015) further elucidate that Biology encompasses an

extensive array of topics, including the structure, function, growth, origin, evolution, distribution, interrelationships, and adaptations of living organisms, as well as the investigation of diseases and the proposal of potential solutions. As a discipline within the natural sciences, Biology employs inquiry methods and discoveries to delve into the complexities of life and the mechanisms governing biological systems. It provides invaluable insights into the mechanisms driving life processes, ecological dynamics, and the intricate web of interactions between organisms and their environments (Huntley, 2023). From the molecular mechanisms governing cellular functions to the ecological dynamics of ecosystems, Biology offers a comprehensive framework for understanding the complexities of life in all its forms.

Biology serves as the foundation for numerous scientific disciplines, including medicine, agriculture, biotechnology, environmental science, and conservation biology. Its principles and methodologies underpin advancements in various fields, from the development of life-saving medical treatments to the conservation of endangered species and ecosystems (Erdogan et al., 2018). In the context of secondary education, Biology plays a pivotal role in shaping students' understanding of the natural world and fostering scientific literacy. Through hands-on experimentation, observation, and critical analysis, students gain a deeper appreciation for the intricacies of life and develop essential skills in scientific inquiry and reasoning (Huntley, 2023). Overall, Biology serves as a gateway to unlocking the mysteries of life and empowering individuals to contribute to advancements in science, technology, and medicine. Its interdisciplinary nature and broad scope make it a cornerstone of scientific exploration and discovery, shaping our understanding of the natural world and our place within it.

In recent years, there has been growing concern over the declining interest, attitude and performance of secondary school students in science subjects in Nigeria, particularly in Biology (Umar et al., 2020; Unodiaku, 2022 & Sunday, 2023). Lavonen *et al*., (2017) posited that attitudes toward Biology among students play a crucial role in their academic performance and career choices in science-related fields. Understanding the factors influencing students' attitudes and their impact on academic achievement is essential for educators and policymakers to develop effective interventions and strategies to improve learning outcomes in Biology. Numerous studies (Osunde, 2019; Gayatri, 2020; Gobert, 2021; Burks, 2022) have emphasized the pivotal role of student attitudes in influencing their academic performance across various disciplines. Specifically, in the context of Biology education, positive attitudes have been consistently linked to enhanced learning outcomes and academic achievement. Students who exhibit positive attitudes towards Biology demonstrate higher levels of engagement, motivation, and interest in the subject matter, which in turn facilitate deeper understanding and mastery of complex biological concepts (Mohamed & Waheed, 2021). For instance, Osunde (2019) conducted a study examining the relationship between student attitudes and academic performance in Biology and found a strong positive correlation between positive attitudes and academic success. Students who expressed enthusiasm and interest in Biology exhibited higher levels of academic achievement compared to their peers with more negative attitudes towards the subject.

Conversely, negative attitudes towards Biology have been shown to impede students' ability to comprehend and retain course material, thereby negatively impacting their academic performance (Mohamed & Waheed, 2021). Students with negative attitudes may display disinterest, lack of motivation, and reluctance to engage with Biology-related tasks, leading to suboptimal learning outcomes and lower academic achievement levels. These

findings underscore the importance of addressing and fostering positive attitudes towards Biology among students to optimize their learning experiences and academic success. By promoting a supportive learning environment that cultivates curiosity, engagement, and enthusiasm for Biology, educators can enhance students attitude and facilitate deeper conceptual understanding, ultimately leading to improved academic performance (Singh, & Manjaly, 2022).

Academic performance, as defined by literatures (Ozoarinze, 2018; Elbilgahy et al., 2021; Reuter & Forster, 2021) encompasses the observable changes in behavior exhibited by students over a given period or within a specific timeframe. González et al., (2021) elaborates further, characterizing academic performance as the level of achievement attained by students across various educational settings, including classrooms, laboratories, libraries, projects, and fieldwork. Aniekwe (2019) offers a nuanced perspective, conceptualizing performance as a means of testing and measuring skills across diverse academic disciplines. In essence, academic performance reflects the successful completion of tasks through exertion, skill development, and perseverance. It serves as a yardstick for assessing students' mastery of course content and their ability to apply knowledge in different contexts (Aronson, 2022). Moreover, academic performance provides valuable insights into students' relative standings and achievements, allowing for comparisons and evaluations of individual and group progress (Etuk, *et al*., 2021). The significance of academic performance extends beyond the classroom, resonating with students, teachers, parents, and society at large. Students aspire to excel academically to secure future opportunities and fulfill their potential, while teachers and parents invest time and resources to support their educational endeavors (Etuk, *et al*, 2021). Additionally, Aronson (2022) opined that academic performance serves as a key determinant of students' educational trajectories, influencing their access to higher education, career prospects, and socioeconomic mobility. Given its multifaceted implications, academic performance remains a focal point of concern and interest for various stakeholders within the educational landscape. Understanding the factors that contribute to academic success and implementing targeted interventions to support students' learning and development are essential for fostering positive academic outcomes and maximizing students' potential for success.

Empirical studies carried out among biology students by Adebisi et al., (2016); Nasir and Anwer (2020) and Shahzad et.al., (2022) in diferrent study areas all indicated a positive relationship between attitude and academic performance among biology students. Also, Yuorsuu (2024) carried out a research among home economics students offering biology course at a senior high school in Ghana. Results of the study revealed a positive significant relationship between students attitude and academic performance in biology subject.Researches (Ekperi *et al*., 2019; Thelwall & Nevill, 2019; Firdoos et al., 2023; Jamal et al., 2023) indicate that gender disparities exist in attitudes towards Biology with females frequently displaying lower levels of interest and confidence in the subject compared to males.

This gender gap in attitudes towards biology has been attributed to various factors, including societal stereotypes, cultural norms, and educational experiences. Archer *et al*. (2020) conducted a comprehensive study exploring gender differences in attitudes towards science subjects, including Biology, among secondary school students. The findings revealed that while both male and female students demonstrated interest in science, females tended to perceive Biology as less relevant or appealing compared to other scientific disciplines. Addressing these gender disparities in attitudes towards biology is crucial for promoting academic success and fostering gender equity in science education.

Creating a positive and inclusive learning environment that encourages active participation and engagement from all students, regardless of gender, is essential (Ekperi *et al*., 2019). Furthermore, initiatives aimed at challenging gender stereotypes and promoting positive role models in Biology can help empower female students and enhance their confidence and interest in the subject (Archer *et al*., 2020). By providing equal opportunities for male and female students to excel in Biology and other science disciplines, educators can contribute to narrowing the gender gap and promoting academic performance for all students. Therefore, this research intends to correlate attitude and performance of students in order to highlight its significance to biology teaching and learning.

Statement of the problem

The divergence in attitudes between male and female students towards Biology has emerged as a significant concern in Nigeria. The researcher's observations of students' performance in the Senior Secondary School Certificate Examination (SSCE) in Lere, Kaduna State have revealed a discouraging trend in academic achievement in Biology over the years. Furthermore, an analysis of students' performance in Biology subject in the West Africa Senior Secondary School Certificate Examination (WASSCE) and the National Examination Council (NECO) in 2022 indicated low rates of distinctions among the students. Considering Biology's pivotal role in medical sciences, one would anticipate a higher prevalence of distinctions and credit passes among Biology students. However, the observed low performance may be attributed to various factors, including gender disparities and students' negative attitudes towards their studies. Given these circumstances, this study aims to delve into the attitudes of students and its impact on academic performance in Biology at Lere, Kaduna State.

Objectives of the study

The objectives of the study are to:

i. determine the relationship between attitude and performance in Biology among secondary school students in Lere, Kaduna State.
ii. determine gender disparity in the attitude of secondary school students towards biology in Lere, Kaduna State.

Research questions

The study was guided by the following research questions:

i. What is the relationship between secondary school students' attitude and academic performance in biology in Lere, Kaduna State?
ii. Is there any gender disparity in the attitude of secondary school students toward biology in Lere, Kaduna State?

Null hypotheses

The null hypotheses postulated are as follows:

HO_1: There is no significant relationship between attitude and performance in biology among secondary school students in Lere, Kaduna State.

HO_2: There is no significant difference in the attitude of male and female secondary school students towards biology in Lere, Kaduna State.

Methodology

In this study, a mixed method consisting of descriptive survey and ex-post facto research designs was utilized to investigate the attitudes and academic performance of Biology students in senior secondary schools located in Lere, Kaduna State. The target population comprised all senior secondary school students in Lere, encompassing twenty-four public senior secondary schools with a collective student population of twenty thousand one hundred and fifty-nine (20, 159) students. A sample size of three hundred and seventy-seven students was selected using simple random sampling based on Krejcie and Morgan's (1970) sample size table.

Data collection was conducted through the administration of a structured questionnaire

titled "Students Attitude towards Academic Performance in Biology Questionnaire (SAABQ)" which was adapted from Fareo (2019). The questionnaire, consisting of 20 items, utilized a five-point Likert scale ranging from Strongly Agreed (SA) to Strongly Disagreed (SD). It was divided into two sections: Section A focused on capturing respondents' biodata, while Section B contained questions aligned with the study objectives. The validity of the instrument was established through expert review by three science education experts from the Department of Science Education, Ahmadu Bello University, Zaria. Additionally, reliability testing was performed on a sample of fifty senior secondary school students using the split-half method. The resulting Cronbach coefficient value of 0.78 indicates satisfactory reliability.

Data collection was done by the researchers in collaboration with biology teachers who served as research assistants in the study area. The questionnaire was administered randomly to students across various schools, and their terminal results were obtained from school records to assess academic performance additionally. Descriptive and inferential statistical analyses, including mean, standard deviation, Pearson Product Moment Correlation (PPMC), and t-test, were employed to analyze the gathered data and test hypotheses.

Results

Table 1: Students Attitude towards Biology in Lere, Kaduna State

S/N	Statement	Mean	Std. Dev	Remark
1.	When I don't understand something, I ask the teachers	2.23	1.07	Low
2.	I exchange views with my classmates about what we study	3.89	1.36	High
3.	In my exercise or study works, I concentrate on others which are already corrected	4.06	1.29	High
4.	When I finished a test, I read it again before handing it	4.08	1.14	High
5.	When I study, I use to consult other sources besides the adoption of Biology book to clarify or widen/increase knowledge	3.97	1.14	High
6.	I revise frequently so as not to forget what I have learn	4.47	0.81	High
7.	To learn something, I have to understand it before	4.52	0.86	High
8.	I read all the questions f the test before beginning to answer it	2.40	0.75	Low
9.	When I have to do some study work, before starting I read a lot about the theme, organize the ideas and write an outline.	4.54	0.70	High
10.	I ask questions on what I study and try to answer them	2.21	0.77	Low
11.	I study biology daily	3.94	1.17	High
12.	I feel distracted when I am studying biology	3.97	1.26	High
13.	I have a jotter that is used to take down note during biology study	2.20	1.29	Low
14.	During biology class, I take down note always	4.05	1.20	High
15.	I always compare my class note with the biology textbook	2.00	1.15	Low
16.	I always relax for 30 minutes after 2 hours study	3.95	1.15	High
17.	I always attend biology class	3.99	1.26	High

18.	I always study my biology note before exams	3.97	1.27	High
19.	I have a sense of mental note before examination	4.27	1.02	High
20.	I feel afraid of examination failure.	3.95	1.24	High
21.	Cumulative Mean	3.63	1.10	High

Benchmark: Mean ≥3.0 = High level; Mean < 3.0= low level

Table 1 shows that the cumulative mean of all the items is 3.63 which is higher than the benchmark mean of 3.0 with the standard deviation of 1.10. This is an indication that there is a positive attitude among students towards Biology learning in Lere, Kaduna State. Particularly, majority of the respondents were of the opinion that they revise frequently so as not to forget what they have learnt. Also, they consulted other sources besides the Biology textbook to clarify or widen/increase knowledge, among others. Among the factors causing low attitude of students in this study area are: not reading all the questions of the test before beginning to answer it (2.40), lack of frequently asking teachers questions (2.23) lack of asking questions on what they students try to answer them but couldn't (2.21), lack of using jotter that is used to take down note during biology study (2.20) and lack of regular comparison of class note with the biology textbook (2.00).

Performance scores of respondents in Biology first term (2021/2022) were collected and analysed. Summary of means and standard deviation is presented in Table 2.

Table 2: Summary of means and standard deviation of Students Performance in Biology at Lere.

S/No	School Code	N	Mean	Std. Dev
1	A	62	47.0	13.2
2	B	49	38.0	13.41
3	C	56	37.5	12.92
4	D	48	40.0	13.23
5	E	43	54.0	13.63
6	F	47	43.5	13.48
7	G	52	38.5	13.56
8	H	30	38.0	13.89
	Cumulative Mean	377	42.06	13.42

From Table 2, the respondents' performance, revealed the cummulative mean value of 42.06 with standard deviation of 13.42.

Table 3: Means and Standard deviation of Attitude of Students offering Biology based on Gender

Gender	N	Mean	Std. Dev	Mean Diff
Male	220	3.61	1.08	
				0.22
Female	157	3-59	1.07	

From Table 3, the respondents' attitude based on gender revealed the mean value for male is 3.61 and standard deviation of 1.08 while for female is 3.56 with standard deviation of 1.08 which implies that the males have slightly higher positive attitude than the females. Significance of the mean difference was tested in the related hypothesis.

Table 4: Summary of PPMC Statistics on the Relationship between Students Attitudes and Academic Performance

Variables	N	Mean	S. D	r	P
Academic performance (%)	377	41.89	13.42		
				0.61	*0.02
Attitude	**377**	**3.63**	**1.10**		

*Significant at the 0.05 level

The correlation between academic performance and students' attitude towards Biology in the study area was computed and presented in Table 4. The analysis revealed a strong positive association between these two variables ($r = 0.61$; $p = 0.02$), which was found to be statistically significant ($p < 0.05$). Consequently, the null hypothesis was rejected, indicating that there is indeed a significant positive relationship between attitude and performance in Biology among secondary school students in Lere, Kaduna State.

Table 5: T-test Analysis of gender disparity in the attitude of students towards biology

Gender	N	Mean	Std	Df	T_{cal}	P value	Remark
Male	220	3.61	1.01				
				375	0.13	0.02	Significant
Female	157	3.59	1.08				

Significant at $P \leq 0.05$

Table 5 presents the results of the t-test analysis examining gender disparities in the attitudes of secondary school students towards Biology in Lere, Kaduna. The calculated t-value from the Table at 95% confidence interval is 1.64. With a p-value of 0.02, which is less than the significance level of 0.05. The analysis indicates a statistically significant gender disparity in the attitudes of secondary school students towards Biology in Lere, Kaduna.

Discussion

Based on the findings in Tables 1 & 4, the study revealed a positive attitude among students toward Biology learning in Lere, Kaduna State ($r = 0.61$, $P = 0.02$). This aligns with the significant positive relationship found between attitude and performance in Biology among secondary school students in the same area. Studies by Adebisi et al., (2016), Nasir and Anwer (2020), Shahzad et.al., (2022) and Yuorsuu (2024) all supported this study as their findings indicate a positive relationship between attitude and academic performance in biology among secondary school students. Tamukong (2017) also observed a significant relationship between student attitudes and performance in Mathematics, emphasizing the impact of cognitive, affective, and behavioral attitudes on academic achievement. These findings underscore the

multifaceted influences on student attitudes and their implications for academic performance. Additionally, Fareo (2019) concluded that attitudes towards biology are influenced by perceptions, beliefs, learning abilities, and previous performance in the subject, suggesting that fostering positive attitudes can lead to improved academic outcomes.

Results presented in Tables 3 & 5 indicates a slightly higher attitude among male students compared to females, with a significant difference noted in their attitudes towards Biology in favour of males in Lere, Kaduna State ($t = 0.132$, $P = 0.02 < 0.05$). This is in line with Ming et al., (2011) who discovered that male students from science classes exhibit more positive attitudes towards academic performance than their counterparts. Erdogan, *et al*. (2018) further supports this notion, revealing a positive relationship between male students' attitudes towards modern learning technologies and their academic achievement. This result might be due to social and cultural factors in the study area. Societal biases and expectations in favour of male against female education might be a factor which needs to be addressed for a more equitable learning environment for all students.

Conclusion

Attitude towards science education serves as a fundamental factor influencing academic performance across various educational settings. The present study underscores the crucial association between students' attitudes towards Biology and their academic performance. The data collected supports the notion that there exists a significant positive relationship between attitude and performance in Biology among secondary school students in Lere, Kaduna State. Furthermore, the study reveals a disparity in the attitudes of male and female secondary school students towards Biology in the same region. These findings emphasize the importance of considering students' attitudes as a key determinant of their academic success in Biology. A positive attitude towards the subject not only fosters greater engagement and motivation but also correlates with enhanced learning outcomes. Conversely, negative attitudes may hinder students' ability to grasp complex biological concepts and impede their overall academic achievement. By understanding and addressing these differences, educators can create a more inclusive and supportive learning environment that caters to the diverse needs and preferences of all students.

Recommendations

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

Educators and parents alike should strive to instill a sense of appreciation and fascination for the subject, emphasizing its relevance and real-world applications. By promoting open communication, collaboration, and mutual respect, teachers can stimulate a thirst for knowledge and make the learning experience more engaging and enjoyable for students.

Kaduna State Government, Lere LGA Education Authority and biology teachers should establish targeted interventions to address the underlying factors influencing students' attitude towards the subject. This will encourage positive attitudes to improve students' academic performance.

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