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Emotional Intelligence, Gender, And School Location As Correlates Of Academic Achievement Of Biology Students In Southwestern Nigeria

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Abstract
This research sought to determine the relationship between gender, school location, emotional intelligence and academic achievement in biology among senior secondary school students in the Odeda Local Government Area of Ogun State, Southwestern Nigeria. Employing a correlational research design, the study involved a sample of 200 students drawn from eight secondary schools. Multistage sampling technique was adopted to select the participants. Data collection was facilitated using an emotional intelligence scale alongside students' biology scores. Descriptive statistics was utilized to analyze demographic information, while inferential statistics, including Pearson correlation and regression analysis, were employed to examine the relationship between gender, school location, emotional intelligence and academic achievement, with the assistance of SPSS software. The results indicated that students exhibited a moderate level of emotional intelligence, and the academic achievement scores predominantly reflected average performance among the respondents. Furthermore, a significant positive correlation was identified between emotional intelligence and academic achievement ($r(100) = .236$, $p = .000$). The results showed significant difference between gender and emotional intelligence as male student had higher academic achievement than their female counterparts. Urban students also demonstrated high emotional intelligence than the rural students which was made evident in their academic achievement. The study concluded that emotional intelligence is a significant predictor of students' academic success in biology. Recommendations include the development of training programmes aimed at enhancing emotional intelligence skills in the students irrespective of their gender and school location.

Keywords: gender; location; participants; correlation

Introduction

Education is a vital component of contemporary society, serving as a foundational element for personal growth, societal advancement, and economic development. It provides individuals with essential knowledge and skills necessary for navigating and contributing to an increasingly complex world, while also fostering critical thinking, problem-solving, and decision-making abilities. Many nations now view the mastery of fundamental skills and concepts as an indispensable aspect of education, recognizing its value as a prerequisite for a robust and sustainable national economy (Cebrero, 2025). Education facilitates the natural and harmonious development of individuals, enabling them to apply the knowledge gained in academic settings to real-world scenarios, thereby enhancing their problem-solving capabilities and coping strategies for future challenges (Walker &Venker, 2019).

Academic performance is closely associated with the students' prospects for success in life, which includes their parents' socio-economic status and overall well-being (Nja et al., 2022). Studies had shown how family background plays a vital

role in the development of mental, emotional, physical, cognitive, and psychological, as well as their academic achievement and learning outcomes (Nja et al., 2021; Poulain et al., 2019)

Given the critical role that secondary education plays in enhancing the quality of life and overall welfare of society, parents, governments, and various stakeholders have consistently prioritized investment in education. Such investment in secondary education is particularly advantageous for many developing nations, as it serves as a cost-effective means of equipping adolescents with essential competencies that require abstract reasoning, enabling them to lead productive lives as contributing members of society. Furthermore, secondary education is integral to balanced strategic planning in national development, as it lays the groundwork for democratic governance and advancements in competitive manufacturing and service sectors (Asemhe et al., 2025).

Emotional Intelligence (EI) encompasses the capacity to comprehend, manage, and effectively utilize one's own emotions while also recognizing, understanding, and influencing the emotions of others. It comprises a range of skills and competencies that are crucial for fostering positive interpersonal relationships, the capacity to make informed decisions and navigate intricate social dynamics is significantly influenced by emotional intelligence. Various models have been proposed to define this concept, including the ability model, mixed model, and trait model (Tyagi & Goutam, 2017). The ability model posits that emotional intelligence encompasses the skills to perceive emotions, integrate them into cognitive processes, comprehend emotional states, and regulate emotions to foster personal development. In contrast, the mixed model, articulated by Daniel (2020), suggests that emotional intelligence comprises a diverse array of competencies and skills that enhance individual performance (Tyagi & Goutam, 2017). Chernnis (2000), indicated that emotional intelligence enables a person to understand his feelings and emotions resulting in directing his actions. Thus, emotional intelligence can be understood as a student's ability to recognize their own emotions, regulate and express them appropriately, and manage interpersonal relationships successfully. It involves the recognition, understanding, and management of both personal and others' emotions, utilizing these skills to achieve success in various life domains. The influence of emotional intelligence on numerous facets of learners' lives, particularly their academic performance, is widely acknowledged.

In the context of education, particularly in Biology, the significance of emotional intelligence in enhancing individual capabilities cannot be overstated. Effective learning is contingent upon students' understanding of learning processes, which necessitates emotional competencies such as self-confidence, self-regulation, effective communication, and collaboration (Kim et al., 2024; Thornhill-Miller et al., 2023). Emotional intelligence is pivotal in determining life success and becomes increasingly crucial as individuals advance in their careers, especially within the realm of secondary school Biology education. It may well represent a fundamental component of personal development that significantly contributes to academic success and career advancement (Chang & Tsai, 2022; Urquijo et al., 2019). Fayombo (2018) identified noteworthy positive correlations between academic success and six components of emotional intelligence, alongside a negative correlation with negative expressivity. Collectively, these emotional intelligence components account for 48% of the variance observed in academic performance. Goleman et al. (2020) delineate emotional intelligence as comprising five fundamental elements, which encompass the capacity to effectively manage interpersonal relationships as well as one's own emotional state. These five domains include interpersonal skills, self-motivation, self-awareness, empathy, and emotional regulation.

A student may possess exceptional training, characterized by a sharp analytical mind and a wealth of innovative ideas; however, the absence of emotional intelligence can hinder the attainment of both academic and

career aspirations. Consequently, it is imperative for students to cultivate robust emotional intelligence to realize and maintain their long-term academic objectives. The advantageous aspect of emotional intelligence is its capacity for development through learning. Numerous studies have established a positive relationship between emotional intelligence and academic performance. For instance, Yusoff et al. (2023) demonstrated that elevated emotional intelligence correlates with enhanced work performance quality.

The aforementioned context highlights the significant role that emotional intelligence plays as a distinct advantage for biology students aiming for enhanced academic success and career progression. Research has demonstrated that emotional intelligence serves as a critical predictor of students' academic performance in both external and internal assessments, as well as preparing them for the workforce post-graduation (Kašparová & Trávníčková, 2025). Furthermore, higher education institutions globally are increasingly focused on cultivating self-reliant individuals within society. The field of biology education provides students with the essential skills, competencies (Onipede et al., 2025f), and insights required to engage in teaching and to contribute positively to societal values, thereby fostering advancements in the sciences.

Research has established that emotional intelligence plays a crucial role in enabling students to learn effectively, attain academic success, and foster positive interpersonal relationships in both their educational and professional lives. Emotional intelligence is increasingly recognized as a vital competency that aids students in achieving and managing their academic objectives. Studies indicate that when effectively harnessed, students' emotional intelligence can serve as a predictor of enhanced academic performance in biology among senior secondary students. While numerous investigations have explored the correlation between students' emotional intelligence and academic performance, there remains a scarcity of research specifically addressing the relationship between gender, school location, emotional intelligence and students' achievement. The existing literature highlights a significant gap in understanding how emotional intelligence influences academic success among secondary school students in the study area. This gap is particularly notable given the recognized importance of emotional intelligence for overall life success and its potential benefits within academic settings.

Literature review

This research is grounded in the theory of John Dewey, which closely aligns with the principles of emotional intelligence (EI). Dewey's framework advocates for a holistic approach to development that encompasses emotional, intellectual, and social growth (Dewey, 1938). His concepts, including experiential learning, social interaction, and critical thinking, provide a strong foundation for fostering emotional intelligence among students. The theory emphasizes the importance of emotional intelligence in both education and human development. Emotional intelligence is the capacity to recognize, understand, manage, and utilize emotions, which is essential for personal and social well-being (Benson, 2014). It includes the ability to accurately perceive and identify emotions in oneself and others, leverage emotions to enhance cognitive processes, and effectively regulate one's feelings as well as those of others, particularly in high-stress situations. Consequently, emotions refine cognitive processes, while cognition guides emotional responses. This interplay establishes emotional energy as a sustained source of motivation for cognitive functioning (Goleman, 1996).

Dewey's contributions have elucidated the essential role of emotions in the learning experience, proposing that emotions are not merely ancillary to cognitive functions but are fundamental to how individuals interpret their experiences and engage with their environment. His pragmatic approach offers profound insights into emotional intelligence (EI) by highlighting the interrelation of emotions, cognition, and social contexts. Dewey asserts that emotions are not isolated internal experiences; rather, they are intricately

linked to social interactions and lived experiences. This perspective aligns with contemporary views on emotional intelligence as a crucial element of effective leadership and decision-making. He emphasized that learning occurs through authentic, meaningful experiences that evoke emotions, thereby enhancing the educational process.

Dewey's pragmatism challenges the traditional separation of reason and emotion, positing that these elements are interconnected and mutually supportive. He asserts that genuine learning occurs when individuals can link their emotional experiences with their cognitive insights, thereby fostering a deeper and more comprehensive understanding of the subject matter. This perspective is bolstered by contemporary research on emotional intelligence, which indicates that individuals with high emotional intelligence often achieve superior academic performance and excel in various aspects of life (Altwijri et al., 2021). Emotions play a crucial role in students' learning processes, influencing their goals, feelings, and overall engagement in education. Emotional intelligence not only enhances psychological well-being by improving interpersonal relationships, resilience, and stress management but also promotes creativity and academic success (Shengyao et al., 2024). Educators who recognize the importance of emotional intelligence in learning can develop instructional strategies that nurture these abilities, such as incorporating emotional literacy, self-awareness, and empathy-building exercises into their teaching methods. By adopting such strategies, they can help students cultivate the emotional and social skills essential for lifelong learning and personal development (Nieto-Carracedo et al., 2024).

Hypotheses

H_{O1}: There is no significant relationship between emotional intelligence and students' achievement in Biology

H_{O2}: There is no significant relationship between self-regulation and students' achievement in Biology

H_{O3}: There is a significant relationship between self-awareness and students' achievement in Biology

H_{O4}: There is a significant relationship between self-motivation and students' achievement in Biology

H_{O5}: There is a significant relationship between social skills and students' achievement in Biology

H_{O6}: There is no significant difference between students' gender and level of emotional intelligence and achievement in biology

H_{O7}: There is no significant difference in students' emotional intelligence and academic achievement in biology based on school location

Method

Research Design: The research employed a correlational survey design. The research was carried out from July-December, 2025.

Population of the study: The target population comprised Senior Secondary School II (SSII) students from secondary institutions within the Odeda Local Government Area of Ogun State, Southwestern, Nigeria.

Participants: A sample size of two hundred (200) students selected through multi-stage sampling technique. Initially, stratified sampling was utilized to choose secondary schools based on their geographical location. From the chosen schools, convenience sampling was applied to identify SS II students enrolled in Biology courses.

Research instruments: The data collection instruments comprised:

1. The Emotional Intelligence Questionnaire (EIQ), adapted for this study, which was originally developed by Petrides in 2009. Responses were recorded on a 4-point Likert scale, ranging from 1 (Strongly Disagree) to 4 (Strongly Agree), with intermediate responses unlabelled. A weighted mean of 2.50 or higher indicated agreement with the items, while a mean of 2.49 or lower indicated disagreement.
2. Academic performance in Biology was assessed using 2023/2024 first term results from the selected schools. Score sheets were employed to gather data on students' academic achievements in Biology, with end-of-term scores and grades converted to

T-score for analysis. The instruments underwent evaluation for face and construct validity. The reliability of the instruments was determined using Cronbach's Alpha, following a pilot test conducted on a sample not included in the main study. A reliability coefficient of 0.89 and 0.76 were obtained for the questionnaire and the students' results, respectively, indicating that the instruments were reliable. A pilot testing was carried out in secondary schools which were not part of the schools under study.

Method of data collection: The researchers administered the questionnaire to the participants one-on-one in the selected secondary schools after due approval by the school principals.

Method Data Analysis: The data collected were sorted and subsequently analyzed using frequencies and percentages while inferential statistics was used to test the following hypothesis. Pearson Product Moment Correlation and Analysis of Variance and t-test. The hypotheses were tested at a 0.05 level of significance.

Results

Tested Hypotheses

Hypothesis One: There is no significant relationship between emotional intelligence and students' achievement in Biology

Table 1: Correlation between Emotional Intelligence and Academic Achievement

Achievement in Biology	Pearson Correlation Sig. (2-tailed)	1
	N	200
Emotional Intelligence	Pearson Correlation Sig. (2-tailed)	.236** .000
	N	200

EI- emotional intelligence; Standardized T-score for academic achievement in Biology; N - Sample

Result in Table 1 shows that students' emotional intelligence and academic achievement were positively and significantly related ($r(200) = .236$, $p = .00$). Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted. That is, the higher the emotional intelligence, the higher the academic performance. Therefore, students with high emotional intelligence are expected to have higher academic achievement than students with low emotional intelligence.

Hypothesis Two: There is no significant relationship between self-regulation and students' achievement in Biology

Table 2: Correlation between self-regulation and Students' achievement in Biology

Achievement in Biology	Pearson Correlation Sig. (2-tailed)	1
	N	200
Self-Regulation	Pearson Correlation Sig. (2-tailed)	.211** .001
	N	200

Self-Regulation; Standardized T-score for academic achievement in Biology; N-Sample

The result above (Table 2) illustrates the correlation between self-regulation and students' achievement in Biology. The analysis reveals that the coefficient linking the self-regulation aspect of emotional intelligence to students' achievement in Biology is statistically significant at $p < .05$. A positive correlation is observed between the two variables ($r = 0.211$**).

Overall, the findings suggest that students' self-regulation, as a component of emotional intelligence, is strongly associated with their performance in Biology. Consequently, the initial hypothesis was rejected in favor of the alternative hypothesis. Thus, it can be concluded that a significant relationship exists between self-regulation and students' achievement in Biology.

Hypothesis Three: There is a significant relationship between self-awareness and students' achievement in Biology

Table 3: Correlation showing the Relationship between self-awareness and students' achievement in Biology

Achievement in Biology	Pearson Correlation Sig. (2-tailed)	1
	N	200
	Pearson Correlation Sig. (2-tailed)	.205**
Self-Awareness		.002
	N	200

Result in Table 3 illustrates the correlation between self-awareness and students achievement in Biology. The analysis reveals that the correlation coefficient for students' achievement in Biology and their self-awareness is statistically significant at $p < .05$. A positive correlation exists between these two variables (r = 0.205**), and this relationship is deemed significant. Consequently, the null hypothesis was accepted.

Hypothesis Four: There is a significant relationship between self-motivation and students' achievement in Biology.

Table 4: Correlation showing the relationship between self-motivation and students' achievement in Biology

Achievement in Biology	Pearson Correlation Sig. (2-tailed)	1
	N	200
	Pearson Correlation Sig. (2-tailed)	.336**
Self-Motivation		.002
	N	200

The result as presented in Table 4 explains the correlation between self-motivation and students' achievement in Biology. The analysis reveals that the correlation coefficient for self-motivation and academic achievement in Biology is statistically significant at $p < .05$. A positive correlation exists between these variables (r = 0.336), and the strength of this relationship is noteworthy. Overall, the findings suggest that self-motivation is strongly associated with students' academic success in Biology. Consequently, the null hypothesis is upheld.

Hypothesis Five: There is a significant relationship between social skills and students' achievement in Biology

Table 5: Correlation showing the relationship between social skills and students' achievement in Biology

Achievement in Biology	Pearson Correlation Sig. (2-tailed)	1
	N	200

Social Skills	Pearson Correlation Sig. (2-tailed)	.086 .174
	N	200

Result in Table 5 demonstrates a positive correlation between social skills, a component of emotional intelligence, and academic achievement among students ($r(200) = .086$, $p = 0.174$, $p > 0.05$); however, this relationship is not statistically significant. As a result, the null hypothesis remains unrefuted. Thus, it can be concluded that there is no significant association between social skills and students' performance in Biology.

Hypothesis Six: There is no significant difference between students' gender and their level of emotional intelligence and academic achievement in Biology

Table 6: Independent t-test showing the difference between students' gender and their level of emotional intelligence and achievement in biology

Variables	Gender	N	Mean	Std.D	df	t	Sig.	Remark
Emotional Intelligence	Male	98	28.72	9.259	198	3.21	.000	S
	Female	102	34.12	12.619				
Academic Achievement in Biology	Male	98	45.09	8.766	198	4.203	.000	S
	Female	102	49.58	9.983				

The findings of the current study indicate a notable disparity in emotional intelligence levels based on students' gender, with a statistical analysis yielding $t (198) = 3.21$ and $P < 0.05$. The mean scores suggest that female students exhibit higher emotional intelligence (34.12) compared to their male counterparts (28.72). Furthermore, a significant difference in academic achievement in biology was identified, with $t (198) = 4.203$ and $P < 0.05$, revealing that female students outperformed male students, scoring an average of 49.58 versus 45.09 in achievement in Biology. As a result, the null hypothesis was rejected, indicating that emotional intelligence is influenced by gender, with female students demonstrating superior emotional intelligence and enhanced academic performance in biology

Hypothesis Seven: There is no significant difference in students' emotional intelligence and academic achievement in biology based on school location

Table 7: T-test showing the difference between Location and students' emotional intelligence and academic achievement in biology

Variables	Location	N	Mean	Std.D	df	t	Sig.	Remark
Emotional Intelligence	Rural	100	29.02	6.212	198	5.031	.000	S
	Urban	100	32.76	5.181				
Academic Achievement in Biology	Rural	100	39.43	6.283	198	5.158	.000	S
	Urban	100	42.32	6.008				

The result as presented in Table 7 shows a notable disparity between the location of schools and the emotional intelligence and academic achievement of students in biology. The analysis indicated that the average emotional intelligence score varied by school location, with students from rural schools exhibiting a lower mean score of 29.02 compared to their urban counterparts, who had a mean score of 32.76. This suggests that students attending schools in urban settings possess higher emotional intelligence than those in rural environments ($t (198) = 5.031$, $P<0.05$). Furthermore, in terms of academic achievement in biology, urban school

students achieved mean scores of M= 42.32 (SD=6.008), while rural students scored lower with M= 36.23 (SD= 6.211). The computed t value of 5.158 exceeded the critical t value of 1.96 at a significance level of 0.05, leading to the rejection of the null hypothesis. Consequently, it can be concluded that there exists a significant difference in both emotional intelligence and academic achievement in biology, contingent upon the location of the school.

Discussion

The findings imply that the majority of the sampled students had average emotional skills to deal with academic issues to achieve desirable academic outcomes in Biology. Similar results were obtained by Roy et al. (2013) in India using a sample of secondary school students. The researcher established that different levels of emotional intelligence predicted different levels of academic motivation and academic achievement. The positive relationship may be attributed to the fact that when students can recognize their emotions and those of others, they can exercise self-control and maneuver successfully through academic challenges. A study carried out by Maraichelvi and Rajan (2016); Abasimi et al., (2025) among students reported that all the domains of emotional intelligence were significantly related to academic achievement. Yunus et al. (2015) also found similar results among college students in South Korea. However, contradictory findings on the relationship between emotional intellect and academic performance have also been reported. The research conducted by Obialor et al. (2024) focused on exploring the relationship between emotional intelligence (EI) and academic achievement among students studying Biology indicated a low positive relationship between students' EI and their academic achievement in Biology. Meanwhile, Mbaegbu et al. (2023) reported that emotional intelligence significantly predicted secondary school students' academic achievement in biology.

Caroll et al. (2019) identified a significant positive correlation between students' self-regulation and their academic performance. Specifically, students exhibiting high levels of self-regulation achieved better academic results compared to their peers with lower self-regulation. Furthermore, the research indicated a notable relationship between the self-regulation aspect of emotional intelligence and students' success in biology. Quílez-Robres et al. (2023); Maraichelvi and Rajan (2016) demonstrated that emotional intelligence serves as a significant predictor of academic success. Their findings revealed that students with elevated emotional awareness scores tended to achieve higher academic results. Yazici et al. (2021) found that factors such as interpersonal relationships, stress management abilities, and adaptability were significant predictors of academic achievement, with interpersonal relationships showing the strongest predictive capability ($r = .46$, $p = .000$). Additionally, a positive correlation was established between self-awareness and academic performance in biology ($r = 0.205$), with this relationship being statistically significant. Consequently, the null hypothesis was rejected, affirming a significant link between self-awareness and students' achievements in biology. A further positive correlation was noted between the variables ($r = 0.336$), with the strength of this relationship also being significant. Overall, the evidence suggests that self-motivation is strongly associated with students' academic success in biology. This aligns with the research conducted by Nurwendah and Suyanto (2019); Santana-Monagas (2025), but contradicts the findings of Celcima et al. (2024), who found no relationship between self-motivation and students academic achievement. The study also revealed a significant difference in emotional intelligence levels based on students' gender ($t(198) = 3.21$, $P < 0.05$). The analysis indicates that female students exhibit higher emotional intelligence scores (34.12) compared to their male counterparts (28.72).

Furthermore, a statistically significant difference in academic performance in biology was identified based on gender, with female students achieving higher scores (49.58) than male students (45.09), as evidenced by the t-test results ($t(198) = 4.203$, $P < 0.05$). This leads to the rejection of the null hypothesis, suggesting that

emotional intelligence is influenced by gender, with female students demonstrating superior scores in both emotional intelligence and biology achievement. This findings deviates from the findings of Meshkat and Nejati (2017), that showed no significant difference between the gender on students total score measuring emotional intelligence, but the gender did tend to differ in emotional self-awareness, interpersonal relationship, self-regard, and empathy with females scoring higher than males. However, this findings deviates from the work of Ahmad et al. (2009) who revealed that males have high emotional intelligence as compare to females. Ali et al. (2021) also reported significant difference in the emotional intelligence of male and female students. Similarly, Jan et al. (2025); Urbón et al. (2025) reported that females generally exhibited higher emotional intelligence more than the males. Additionally, the findings highlight a significant relationship between the location of schools and students' emotional intelligence and academic performance in biology. The mean emotional intelligence score for students in rural areas was found to be lower (29.02) than that of students in urban areas (32.76). This suggests that urban students possess higher emotional intelligence than their rural peers, supported by the t-test results ($t(198) = 5.031$, $P < 0.05$). In terms of biology achievement, urban students also outperformed rural students, with mean scores of 42.32 (SD = 6.008) versus 36.23 (SD = 6.211), respectively. The calculated t value of 5.158 exceeds the critical t value of 1.96 at a significance level of 0.05, leading to the rejection of the null hypothesis. Therefore, it can be concluded that both emotional intelligence and academic achievement in biology are significantly affected by the location of the school. This is in contrary to the findings of Mathialahan et al. (2020) who found no significant differences between school environment and emotional intelligence.

Conclusion

This study examined the relationship between emotional intelligence and academic achievement in biology among senior secondary school students in Odeda Local Government Area of Ogun State, Southwestern, Nigeria. The findings revealed a significant positive relationship between emotional intelligence and academic achievement, indicating that students with higher levels of emotional intelligence performed better academically in biology. Specifically, components of emotional intelligence such as self-regulation, self-awareness, and motivation were significantly correlated with academic performance. These results had shown the importance of emotional intelligence as a critical factor in students' academic success, particularly in biology, a subject that demands not only cognitive but also emotional stability to comprehend complex concepts. The study concludes that emotional intelligence is a significant predictor of academic achievement, emphasizing the need for targeted interventions to enhance students' emotional intelligence for improved educational outcomes.

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Conflict of interest

Authors declare no conflict of interest

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