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Students' Psychological Variables and Academic Achievement in Biology in Abak Local Government Area of Akwa Ibom State, Nigeria

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ABSTRACT

This study examined self-efficacy and self-confidence as correlates of academic achievements among Biology students in public secondary schools in Abak Local Government Area, Akwa Ibom State, Nigeria. The study adopted the correlational research design. The study population consisted of all SSII Biology students drawn from 11 public secondary schools for the 2025/2026 session. The sample of the study was 225 SSII intact class students chosen from five schools in the population. The schools were chosen using stratified sampling techniques. The instruments used were the Terminal Continuous Assessment Result in Biology (TCARB) and the Biology Psychological Variable Questionnaire (BPVQ). The reliability of BPVQ was found to be 0.72. Data were collected and analysed using correlation coefficients (R) from simple linear regression for research questions and ANOVA at a 0.05 level of significance for hypotheses. Findings revealed no significant relationship between students' psychological variables (self-efficacy and self-confidence) and academic achievement in Biology; there is a low relationship between the constructs. Based on these results, it was concluded that there is a low relationship between students' psychological variables and academic achievement in Biology. It was recommended that students should use their self-efficacy and self-confidence to promote their achievement in Biology.

Keywords: *Students' psychological variables, academic achievement, biology, self-efficacy and self-confidence*

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INTRODUCTION

Science Education is a sine qua non for the attainment of deep knowledge in understanding the world we live in. The development of a nation hinges on the quality of its science education. Science education is a tool for the scientific and technological development of any nation, as it enhances scientific thinking and students' curiosity about their environment. It enables students to cultivate an interest in inquiry and learning. Through inquiry, students recognise the nature of science and develop scientific knowledge and science process skills, which help them evaluate the impact of scientific development.

According to Utibe & Olah (2024), science subjects taught in Nigerian senior secondary schools are Biology, Chemistry and Physics. Some of the most distinct and similar characteristics of these science subjects are experimentation, observation and discovery. These provide the development of scientific skills, such as asking questions and making investigations. Biology is a branch of science that studies living and non-living things, plants and animals, the nature of organisms, and their relationship with one another and their environment. Given its broad applications, Biology contributes substantially to individual intellectual development and is essential for adapting to the modern world. Its importance has earned it a prominent place in Nigeria's senior secondary school curriculum for science-oriented students (FRN, 2018).

According to Umaru (2021), biology is a natural science that deals with the living and non-living world; how the world is structured, how it functions and what these functions are: how it develops, how living things came into existence and how they interact with one another and with their environment. Maduabum (2019) highlighted the importance of biology to include: helping individuals to understand the parts of his or her body and their functions; enabling one to question superstition due to sustained interest arising from comprehension of the cause of events; understanding and appreciating life; bringing into focus the need to maintain good health; promoting the individual for choice of careers; inculcating in the individual scientific skills and attitudes in his approach to personal and societal problem; imparting factual knowledge and stimulate scientific reflective thinking so as to produce a better informed individual.

Achievement in biology is crucial as it determines access to careers in health, medicine, and life sciences. Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in the instructional environment (Stainmayr *et al.,* 2024). It refers to the level of schooling one has successfully completed and the ability to attain success in one's studies. Academic achievement is the extent to which students, teachers or institutions have achieved their short, medium or long-term educational goals. Success in senior secondary school examination or any other level of examination is a symbol of academic achievement. What constitutes academic achievement according to Nwagbo

(2023) and Uboh *et al.* (2024) is the learning outcomes; knowledge attained from the teaching process, commonly measured by examination or continuous assessment.

Matthews & McBee (2023) stressed that the problem of academic underachievement has intrigued educators' concerns. They added that the issue of academic underachievement is not a problem only among gifted learners but prevails at all ability levels. Academic underachievement can be conceptualised as a decline in students' performance in classwork, tests, or standard examinations, when compared to their actual performance. The academic underachievement is performing below expectation or potential. The academic achievement of students in Biology in public examinations organised by external examination bodies such as the West African Examinations Council (WAEC), National Examinations Council (NECO) and Joint Admissions Matriculation Board (JAMB) in Nigeria has been consistently poor, and students' persistent poor achievement has been worrisome in recent years.

Amasuomo (2019) declared that academic achievement is characterised by performance on tests associated with coursework and the performance of students on other types of examinations. The poor performance of the candidates in public examinations reflects the level of failure at the senior secondary schools. Factors have been identified as the causative factors responsible for the poor performance in examinations. Academic achievement is influenced by multiple psychological factors that shape students' ability to learn, stay motivated, and perform effectively in academic settings. Among the most significant of these variables are self-efficacy and self-confidence, considered in this study. Therefore, understanding the role of these psychological traits in educational outcomes is important.

Self-efficacy refers to trust in one's ability and actualising the intellectual, conduct, or social aptitudes vital for the successful performance of a task (Zimmerman, 2020). X-raying the potency of self-efficacy, as in Slajkovic & Luthans (2019), the meta-analysis observed that self-efficacy beliefs accounted for a 28% increase in academic achievement. The term "self-efficacy" refers to how one perceives one's ability to perform a specific task. It is a personal evaluation of one's capability to plan and execute a series of actions to achieve a desired learning outcome (Linnenbrink-Garcia *et al.*, 2018; Utibe & Olah, 2024).

Ilori (2024) investigated the relationship between self-efficacy and academic achievement among secondary school students. The result of the findings showed that there was no significant relationship between self-efficacy and the academic achievement of secondary school students. Students with low self-efficacy often make more mistakes in metacognition tasks during neuropsychological tests, which result from the underestimation made by the student in relation to the student's judgment of personal performance based on the prediction and monitoring of their own performance (Gutiérrez-García & Landeros-Velázquez, 2018). This is relevant because self-efficacy influences how a student feels, thinks and acts (Bandura, 2023). A high sense of self-

efficacy facilitates information processing and cognitive performance, including decision making and academic achievement (Mafla *et al*., 2019).

The word "Self-confidence" is a compound word, derived from the two root words 'Self and Confidence'. In a proper attempt to define self-confidence scientifically, there is a need to first and foremost delve into numerous scholarly meanings of these two words, one after the other. The self is a person's essential being that distinguishes them from others. Self is the conscious reflection of one's own being or identity, as an object separate from others" (Kumari *et al.*, 2016). Self-confidence is a vital psychological attribute that significantly influences students' academic performance and overall learning experiences. It is an overall feeling of being capable in many situations and also overcoming challenges. When students possess a healthy level of self-confidence, they are more likely to engage actively in learning activities, persist in the face of difficulties, and develop a genuine interest in their studies. Conversely, low self-confidence can lead to anxiety, avoidance, and a diminished desire to learn. Self-confidence in students refers to their perception of their competence and efficacy in academic tasks. Higher self-confidence often fosters increased interest, which in turn can reinforce confidence.

According to Perkins (2018), self-confidence is related to success, achievements, conciliation, and a person's well-being. Self-confidence allows a student to take risks and engage in learning activities, and those with self-confidence are assured of their abilities. They set goals for themselves and work hard to achieve their goals without worrying about the outcomes. Academic self-confidence, which refers to the standard of ideas or the assurance that a person has in his/her own ability to achieve academically, is assessed within the inclusivity of the academic self-confidence scale developed by Jones (2021). Considering its significant social role in students' academic development, it is acceptable to say that academic self-confidence is not only an instigator, but a judgment about the capabilities or accomplishment of some academic goal.

Therefore, it must be considered within a broader conceptualisation of motivation that assures positive academic concentration and resilience to achieve academic goal settings. It shows that academic self-confidence could be a potent predictor of students' academic achievement. As this has been conceived as students' perceived ability and perceived academic tasks (Komarraju & Nadler, 2022). Studies have also shown that low achievers are more likely to manifest psychological problems. The observed psychological problems affecting students' academic achievements include poor attitude to studies, low self-concept and poor study habits, among others. Thus, understanding and addressing psychological variables in educational settings may prove to be a pivotal intervention. This study was inspired by the observation of increasing cases of emotional challenges among adolescents, which often go unnoticed in schools, and also the observation that many studies show fear, anxiety and low confidence toward biology.

Despite the positive findings linking psychological variables to academic achievement, there are still gaps in understanding how psychological variables influence

specific subjects, such as Biology in Abak Local Government Area. It is in this background that the present study deems it necessary to examine the correlates of students' psychological variables and Academic Achievement in Biology in Abak Local Government Area, Akwa Ibom State.

Statement of the Problem

There is an increasing public outcry about students' poor academic achievement in secondary schools, especially in Biology, which is one of the science subjects. The study of biology in senior secondary schools is expected to equip students with useful concepts, principles and theories that will enable them to face the challenges before and after graduation. Despite Biology's critical importance as a foundational science subject, essential for understanding many scientific principles and key to various professional fields such as medicine, agriculture, and environmental sciences, students' performance in the subject continues to decline. This trend is evident in both internal assessments conducted within schools and external examinations, like the West African Senior School Certificate Examination (WASSCE) and the National Examinations Council (NECO).

The inability of students to attain satisfactory grades has raised serious concerns among educators, parents, and policymakers. At the heart of this problem is students' difficulty in grasping essential concepts in Biology, resulting in an overall failure to acquire the knowledge and skills necessary not only for academic progression but also for practical applications in everyday life. The unique demands of Biology are both theoretical understanding and practical application, which may interact with psychological factors in ways that differ from other subjects. Moreover, research on psychological variables and students' achievement in science subjects shows a dearth of literature on the prediction of self-efficacy and self-confidence on achievement in Biology, in Abak Local Government Area of Akwa Ibom State. This has created a subject-specific and contextual gap, which this study intends to bridge. Thus, the researcher finds it pertinent to study the effect of Students' psychological variables (self-efficacy and self-confidence) on the academic achievement of biology students in Abak Local Government Area for the 2025/26 academic session.

Purpose of the Study

The study investigates self-efficacy and self-confidence as correlates of academic achievements among Biology students in public secondary schools in Abak Local Government Area. Specifically, the study was designed to achieve the following objectives:

1. Establish the relationship between students' self-efficacy and academic achievement in Biology.
2. Establish the relationship between students' self-confidence and academic achievement in Biology.

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Hypotheses

The following null hypotheses were formulated for the study and tested at a 0.05 level of significance:

1. There is no significant relationship between students' self-efficacy and academic achievement in Biology.
2. There is no significant relationship between students' self-confidence and academic achievement in Biology.

Significance of the Study

The findings of this study hold significant importance to various stakeholders in the educational sector and beyond. They include: students, teachers and other researchers. Students who are the primary beneficiaries of the findings of this research will find this study useful, as it will educate them positively on self-efficacy and self-concept. It will also empower them with the necessary skills needed to overcome the pressure from the above variables, thereby increasing their academic achievement. Teachers will benefit immensely from this research as it will enlighten them on anxiety problems. It will also enlighten them and equip them with the skills to help learners have positive self-efficacy and self-confidence. Teachers will understand the need to help learners develop positive self-concept and reduce anxiety towards academic work. Finally, other researchers of education, sociology, management, psychology and social sciences would find this study useful in carrying out further research on self-efficacy and self-concept in the secondary school setting.

Scope of the Study

This study specifically focused on students' psychological variables and academic achievement in Biology. The Psychological variables are: self-efficacy and self-confidence. The study was conducted in Abak Local Government Area, Akwa Ibom State, for the 2025/26 academic session. The study was exclusively limited to Biology students in selected public secondary schools in Abak Local Government Area, Akwa Ibom State, Nigeria.

METHOD

The study adopted a correlational research design to examine the relationship between students' psychological variables and academic achievement in Biology in Abak Local Government Area, Akwa Ibom State. This design was used to find out correlation between self-efficacy, self-confidence and academic achievement among SSII Biology students in Abak Local Government Area. It is situated between coordinates: Latitude 4°.59'N and 7°.47'E of the North Equator and longitude 4°.983'N and 7°.783'N of the Greenish meridian. Abak Local Government Arare comprises five clans: Abak, Afang

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Obong, Midim, Ediene and Otoro. The people of Abak are generally Annang. They are reputed for their resourcefulness and highly mobilised for economic development. Abak's rich cultural heritage is reflected through traditional dances such as Idiong, Attat, and Utu-Ekpe. The population of this study comprised all Senior Secondary Two (SSII) students offering Biology in the 11 public secondary schools in Abak Local Government Area of Akwa Ibom State for the 2025/2026 session (State Secondary Education Board, Uyo, 2025).

A total of 225 Senior Secondary two biology students formed the sample size for this study. A stratified sampling technique was used for this study, with clans serving as strata to ensure fair representation of students from different socio-cultural backgrounds. The selection of the Biology students was based on the spread of the schools to ensure that the selected schools truly cut across the Abak Local Government Area. The choice of using the clans as strata and a stratified sampling technique was borne out of the reasons that each student in the population has an equal chance of being selected, no bias in the selection and entirely on the merit of the member, not as determined by another member.

The researcher used a self-developed questionnaire as the instrument for data collection. Data were collected using the Biology Psychological Variable Questionnaire (BPVQ) and Terminal Continuous Assessment Result in Biology (TCARB). The BPVQ is a structured questionnaire that contains 10 items for Self-efficacy and 10 items for self-confidence, making a total of 20 questions, each developed in a 4-point Likert scale. The respondent was expected to tick the appropriate option in the space that was provided in front of each item. These options were SA (Strongly Agree), A (Agree), SD (Strongly Disagree), and D (Disagree). The students were required to indicate which choice best represented their interest. To ascertain that the (BPVQ) research instrument and the biology students' continuous assessment booklet for the 2025/2026 session actually measure what they intend to measure, before final data extraction, the instrument was face validated by two Biology lecturers in the Department of Science Education, one lecturer in Research Measurement and Evaluation, all in Akwa Ibom State University, Ikot Akpaden. The three validators assessed the appropriateness of the items in the instruments in providing correct responses to the research questions and their validity verdict and comments were incorporated into the final production of the instruments.

To establish the reliability of the instruments, a test-retest reliability procedure was used. The Biology Psychological Variable Questionnaire (BPVQ) was administered to a sample of 30 SSII Biology students who are qualified but do not form part of the main sample for the study. After an interval of two weeks, the same instrument was administered to the same students, and their responses were scored. The initial and re-tested scores were correlated using Pearson's Product-Moment Correlation and multiple regression. The reliability coefficient for the Biology Psychological Variable Questionnaire (BPVSQ) of 0.72 is considered to be a high reliability coefficient. The

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instrument is a Likert scale: 4 = SA (Strongly Agree), 3 = A (Agree), 2 = SD (Strongly Disagree) and 1 = D (Disagree) on the Biology Psychological Variable Questionnaire (BPVQ) and academic achievement in biology in Abak Local Government Area.

The researchers earlier visited the selected secondary schools, and a letter of introduction was sent to seek permission/consent from the principals of the schools, for the cooperation of the teachers. The BPVQ was administered personally by the researcher with the help of the Biology teachers in the selected schools. The researcher explained to the students the procedure for filling out the questionnaire and the students were given 25 minutes to respond to the questions in the questionnaire as appropriate. Clear instructions were also provided by the researcher on the questionnaire to ensure that the participants understood the purpose of the study. The study recorded 100% return rate of the questionnaire. The independent variables' (self-efficacy and self-confidence) scores were obtained from the students' responses on the questionnaire, while the dependent variable (students' academic achievement scores in biology) was obtained from the Terminal Continuous Assessment Results in Biology (TCARB) for SSII biology students of the school sampled for the study.

The data for this study were analyzed using SPSS. Research questions, 1 and 2 were answered using correlation coefficients (R) from simple linear regression. Hypotheses were tested using ANOVA at a 0.05 level of significance. Details of the analyses were presented in tables.

RESULTS AND DISCUSSION

Table 1: Relationship between students' self-efficacy and academic achievement in Biology

Model	**R**	**R^2**	**Adjusted R^2**
1	0.085	0.007	0.003

R= Correlation coefficient, R^2 = Coefficient of determination

Table 1 shows that the correlation coefficient obtained for the relationship between students' self-efficacy and academic achievement in Biology was 0.09. A positive and very low relationship exists between students' self-efficacy and academic achievement in Biology.

Table 2: Relationship between students' self-confidence and academic achievement in Biology

Model	**R**	**R^2**	**Adjusted R^2**
1	0.029	0.001	-0.004

R= Correlation coefficient, R^2 = Coefficient of determination

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Table 2 shows that the correlation coefficient obtained for the relationship between students' self-confidence and academic achievement in Biology was 0.03. This means a positive and very low relationship exists between students' self-confidence and academic achievement in Biology.

Table 3: Regression analysis for the significance of the relationship between students' self-efficacy and academic achievement in Biology

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	163.161	1	163.161	1.619	0.205
	Residual	22473.799	223	100.779		
	Total	22636.960	224			

$\alpha = 0.05$, where, df = Degree of freedom

Table 3 shows that an F-ratio of 1.62 with an associated probability value of 0.21 was obtained. This probability value of 0.21 was compared with 0.05 set as the level of significance for testing the hypothesis, and it was insignificant because 0.21 is greater than 0.05. Therefore, the null hypothesis that there is no significant relationship between students' self-efficacy and academic achievement in Biology was upheld. The inference drawn was that students' self-efficacy has no significant relationship with academic achievement in Biology. Table 3 shows a positive and very low relationship between students' self-efficacy and academic achievement in Biology. Students' self-efficacy has no significant relationship with academic achievement in Biology, though there is a low relationship between the two constructs (self-efficacy and academic achievement in Biology). The reason for this low relationship might be that the psychological construct of self-efficacy has no direct academic link with students' achievement, which is a conceptual construct. The findings of this study were in contrast with Mafla *et al.* (2019), who investigated self-efficacy and academic performance in Colombian dental students. Unlike the present study, which shows a very low relationship, Mafla *et al.* (2019) observed a strong positive correlation between self-efficacy and performance in mathematics.

Table 4: Regression analysis for the significance of the relationship between students' self-confidence and academic achievement in Biology

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.927	1	18.927	.187	.666
	Residual	22618.033	223	101.426		
	Total	22636.960	224			

$\alpha = 0.05$, where, df = Degree of freedom

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Table 4 shows that an F-ratio of 0.19 with an associated probability value of 0.67 was obtained. This probability value of 0.67 was compared with 0.05 set as the level of significance for testing the hypothesis, and it was insignificant because 0.67 is greater than 0.05. Therefore, the null hypothesis that there is no significant relationship between students' self-confidence and academic achievement in Biology was upheld. The inference drawn was that students' self-confidence has no significant relationship with academic achievement in Biology. Table 4 shows a positive and very low relationship between students' self-confidence and academic achievement in Biology. Students' self-confidence has no significant relationship with academic achievement in Biology, though there is a low relationship between the two constructs (self-confidence and academic achievement in Biology). The reason for this positive relationship might be that the psychological construct of self-confidence has a direct academic link with students' achievement, which is relevant to the conceptual construct. The findings of this study were in line with the work of Ilori (2024), who investigated self-efficacy and academic achievement among secondary school students in Irewole Local Government. The reviewed work and the present study are in Biology, which show a very positive relationship with academic achievement in Biology.

Summary of the Study

There has been a decline in the academic achievement of students in Biology. The major reason attributed to this poor academic achievement is suspected to be the psychological states of the students. Therefore, there is a need to improve the psychological states of the students. The main aim of the study was to investigate the effect of self-efficacy and self-confidence as correlates of academic achievements of Biology students in public secondary schools in Abak Local Government Area. The study was guided by two research questions and two null hypotheses, which were tested at the 0.5 level of significance. The review of this study covered: conceptual and empirical studies. This study adopts a correlational research design to examine the relationship between students' psychological variables and academic achievement in Biology in Abak Local Government Area, Akwa Ibom State. The population was 3036 Senior Secondary Two (SSII) students offering Biology in the 11 public coeducational secondary schools in Abak Local Government Area of Akwa Ibom State for the 2025/2026 session. A total of 225 Senior Secondary Two biology students formed the sample size for this study. A stratified random sampling technique was used to select the clans and schools.

Biology Psychological Variable Questionnaire (BPVQ) and Terminal Continuous Assessment Result in Biology (TCARB) were the instruments used for data collection of the study. The data collected were analysed using SPSS. The hypotheses were tested using ANOVA at a 0.05 level of significance. The findings showed a positive and very low relationship between students' self-efficacy and academic achievement in

Biology. Students' self-efficacy has no significant relationship with academic achievement in Biology; there is a low relationship between the two constructs, and there is a positive and very low relationship between students' self-confidence and academic achievement in Biology. Students' self-confidence has no significant relationship with academic achievement in Biology, though there is a low relationship between the two constructs. It is concluded that students' academic achievement could be improved depending on the potency of self-efficacy and self-confidence. Based on these findings, it is recommended that students' self-efficacy and self-confidence should be used to improve students' achievement in Biology.

CONCLUSION

The study examined self-efficacy and self-confidence as correlates of academic achievements among Biology students in public secondary schools in Abak Local Government Area, Akwa Ibom State, Nigeria. The findings indicate a positive and very low relationship between students' self-efficacy and academic achievement in Biology. Students' self-efficacy has no significant relationship with academic achievement in Biology, though there is a low relationship between the two constructs. There is a positive and very low relationship between students' self-confidence and academic achievement in Biology. Students' self-confidence has no significant relationship with academic achievement in Biology, though there is a low relationship between the two constructs.

RECOMMENDATIONS

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

1. The Biology Students should use their self-efficacy to promote their academic achievement in Biology.
2. The Biology Students should use their self-confidence to promote their academic achievement in Biology.

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