

SELF-EFFICACY, PERSONAL INTEREST AND SENIOR SECONDARY STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY IN CALABAR EDUCATION ZONE, CROSS RIVER STATE, NIGERIA.

BY

Offiong, Agnes Edet Asuquo (ORCIDNo: [https://orcid.org/000-0000-34743-6808\(agnesoffiong04@gmail.com\)](https://orcid.org/000-0000-34743-6808(agnesoffiong04@gmail.com)))¹ Effiong, Effiom, Etim, (effiome70@gmail.com), ORCID ID: 0009000787449191)² Agbor, Catherine Kuko, catherinekukoagbor@gmail.com, ORCID ID: 000900053835807x³ Oyamo, Vincent Ita, orcid: 0009-0003-1096-5674, comradeoyamo@yahoo.com)⁴ Ogbor, Comfort Omari, ORCID No; 0009-0001-8301-0743, comfortogboromari@gmail.com)⁵

^{1,4&5}Environmental Education Department, University of Calabar, Calabar.

^{2&3}Biology Education Department, University of Calabar, Calabar.

Corresponding author: Dr. Agnes Offiong (agnesoffiong04@gmail.com)

Abstract

The persistent decline in academic achievement of senior secondary school students in Biology, particularly in Cross River State, has become a pressing concern for educators, parents, and policymakers. It is on the ground of this concern that the study sort to investigate the influence of self-efficacy and personal interest on Senior Secondary Student's academic achievement in Biology in Calabar Education Zone of Cross River State. Two research questions were formulated to guide the study and ex-post facto research design was adopted. The population of the study comprised all Senior Secondary School two (SS2) Biology students with a total of 16,104 and a sample of 433. Two instruments were used for data collection namely: a questionnaire titled Students' Variables Questionnaire (SVQ) and an achievement test tagged "Biology Achievement Test (BAT). While the SVQ was constructed by the researcher, the BAT was adapted from WAEC past questions in Biology. The instruments were validated by three experts, one from measurement and evaluation and two from Biology education, University of Calabar. The reliability coefficient obtained were 0.93 and 0.80 using Kuder Richardson's formula. All the research questions and hypotheses were tested at 0.05 level of significance. The statistical tools used for research questions was Multiple correlation coefficient and hypotheses were, Pearson product Moment correlation, One-way Analysis of Variance (ANOVA). From the findings, there was a negative but statistically non-significant relationship between students' self-concept and their academic achievement in Biology, leading to the null hypothesis being retained. It was concluded that while self-efficacy alone showed a negligible or non-significant relationship with academic achievement in Biology among others. Based on the findings, the study recommended among others that enhancing students' self-efficacy are crucial, given its significant relationship with academic achievement in Biology.

Keywords: Self-efficacy, Personal interest, Academic Achievements, Biology

Introduction

The process where a person develops skills is essentially important to daily living; learning social norms, developing judgment and reasoning, and learning how to discern right from wrong, this process is education. The ultimate goal of Biology education is to help an individual understand life processes and contribute to society (Turkmen, 2017). The primary goal of science is to learn how nature works by observing the natural and physical world by use of sensory experiences or aided instruments for the quantitative and qualitative description of the world and the regularity of events that take place in it. Machebe, (2017) posits that the thrust of science is to explain and understand natural phenomena, events, and processes. Kanel (2018) emphasized that the aim of science is to detect with senses those distinguishing perspectives, the order that exist between and among the facts put forth by scientists, Biology education aims to help individuals understand life processes and contribute positively to society (Turkmen, 2017).

The study of Biology, as the science of life, is critical to medical science and related disciplines, thus necessitating its emphasis in secondary education (Knight & Wood, 2019). Consequently, Biology is a required subject for students aspiring to pursue science-related courses at the tertiary level (Knight & Wood, 2019). Despite the importance of Biology, senior secondary school students continue to exhibit poor academic performance in the subject, which has become a significant concern for educators and stakeholders (Knight & Wood, 2019). This poor performance persists even though many students retain a keen interest in enrolling in Biology for the Senior Secondary School Certificate Examination (SSCE). Evidence from the performance profile of Cross River State government secondary school students in Biology for the West African Examination Council (WAEC) from 2019-2023 shows a low percentage of candidates achieving a credit pass. For instance, the year 2021 recorded the lowest credit pass rate at 29.67%. This indicates a lack of progressive improvement in the academic achievement of students in Biology as shown below.

TABLE 1

Summary of WAEC results in Biology in Government secondary schools in Cross River State (2019-2023)

Year	No registered	A1-C6	% Passed	D7-E8	% Failed
2019	17,132	7,126	41.59%	10,006	58.45%
2020	18,527	6,175	33.33%	12,352	66.67%
2021	17,443	5,175	29.67%	12,268	70.34%
2022	16,850	4,021	23.86%	12,829	76.14%
2023	19,371	6,521	33.66%	12,850	66.34%

Source: Cross River State Ministry of Education, Calabar (2023)

The persistent reports of poor performance in SSCE Biology have drawn considerable attention from science educators, leading to ongoing research to identify causal variables for this repeated failure (Ajaja & Kpangban, 2016; Esiobu, 2015). Jegede (2016) reported factors responsible for students' poor performance in science to include among others, students' factors, teaching method and inadequate number of teaching facilities. Akanbi and Kolawule (2017), in their work have attributed this poor performance to teachers' methodology, structuring of the curriculum, the concentration of examination questions on few topics, the inability of students to perform enough practical before examination.

In addition, a study by Jegede and Awodu (2016), suggested that poor performance in science generally and Biology in particular in Nigeria could be as a result of some variables such as poor reading habits, students' negative attitude/interest towards Biology, gender inequalities. The present study therefore seeks to find out if students' self-efficacy and personal interest have any relationship with their academic achievement in Biology in Calabar Education Zone of Cross River State. The independent variables considered include students' self-efficacy and interest, aspiration, as it relates to their academic achievement in Biology. Self-efficacy refers to beliefs in one's capabilities to organize and execute courses of action required to produce given attainments..

According to Encarta Dictionary (2016), "interest is a feeling of curiosity or concern about something that makes attention turn towards it". As opined by Hidi, Renninger and Krapp (2020) personal interest develops slowly and tends to have long-lasting effects on a person's knowledge and values, whereas situational interest is an emotional state that is evoked suddenly by something in the immediate environment and that may have only a short-term effect on an individual's

knowledge and values. Situation interest is aroused as a function of the interestingness of the content and context and partially under the regulation of teachers (Schraw & Lehman, 2018). Various researches have indicated positive relationships between student's interest and learning (Trumper, 2016; Elster, 2017; Logan & Skamp, 2018). However, there are also many findings that show that interest declines as students pass through the secondary school years (Chiappetta & Koballa, 2016; Babalola, & David, 2019).

Academic achievement is very much related with academic or career aspirations. Career aspiration reflects directly or indirectly the personality of the students. Whatever a student has aspired, if gained, brings a lot of satisfaction and confidence in the student. Setting up of too high a goal beyond potential, individual will, however, have disturbing effect, producing a sense of frustration. Such experiences bring negative reaction life feelings of inferiority complex. Arts students generally have high life goals and aspirations that lead to frustration. A satisfied person is one who thinks, imagines and sets target according to his/her abilities and capacities. The measurement of a person's aspiration is a complex psychological problem which has troubled psychologists for a long time. It is a measure of his intentional disposition. By knowing a person's aspirations, we learn a great deal about him/her. It is a conspicuous index of the person as an individual and as a member of society which is determined by the amount of self-esteem one needs to maintain (Singh, 2020).

Purpose of the study

The purpose of the study is to investigate self-concept, personal interest and Senior Secondary Student's academic achievement in Biology in Calabar Education Zone of Cross River State. Specifically, the study seeks to:

1. find out how students' self-efficacy relates to academic achievement in Biology.
2. ascertain how students' personal interest relates with their academic achievement in Biology.

Research questions

The following research questions were raised to guide the study:

1. How does students' self-efficacy relate to their academic achievement in Biology?
2. How does students' personal interest relate to their academic achievement in Biology?

Literature Review

Fitrian, Zubaidah, Susilo and Al Muhdha (2020) carried out a study on Students' SelfEfficacy on Biology Lesson of Senior High Schools in Bengkulu City, Indonesia. The purpose of the research was to know the self-efficacy of State Senior High School students in Bengkulu City, Indonesia toward Biology Lesson. Measurement of self-efficacy refers to 3 aspects, namely magnitude, strength, and generality. The method used was survey method. The samples of the research were 160 students of class X of academic year 2017/2018 taken from Public High School (SMAN) 1, Public High School (SMAN) 2, Public High School (SMAN) 4, Public High School (SMAN) 5 and Public High School (SMAN) 6. The results of the study showed that the average self-efficacy of students are 58.60 on magnitude aspect with the medium category, 56.85 in strength aspect with the medium category, and 48.70 in generality aspect with the low category. Based on the results of this study, it is necessary to improve the learning process especially by using models of learning that can improve students' self-efficacy in Biology Lessons.

Osman and Mehmet (2020), in their studies on self-efficacy towards Biology, opined that anxiety and self-efficacy are among the factors that impact students' performance in Biology. The study aims to investigate high school students' perception of Biology anxiety and self-efficacy, in relation to gender, grade level, interest in Biology, negative experience associated with Biology classes, and teachers' approaches in the class. The research was designed as a survey model. The research results showed that interest in Biology and negative past experience were significant predictors of students' Biology anxiety and that students' Biology self-efficacy percepts significantly differed on gender, grade level, interest in Biology, past experiences, and teachers' approaches in the classes.

Baldwin, Ebert-May and Burns (2018), carried out a study on the development of a college biology self-efficacy instrument for non-majors. According to the authors, in an effort to test the effectiveness of teaching and learning strategies that may increase biological literacy for nonBiology majors, an NSF-funded research project called "The Slice of Life," was conducted from 1994 to 1998. In the present study, a self-efficacy instrument was constructed and designed specifically for the project to determine students' self-reported confidence in understanding and using Biology in their lives. More specifically, by using the self-efficacy tool as a pre- and posttest indicator, instructors can gain insight into whether students' confidence levels increase as they engage in more complex tasks during the course, and, in addition, what type of teaching strategies are most effective in building confidence among students to achieve biological literacy.

Uitto (2019), conducted a study on Interest, Attitudes and Self-Efficacy Beliefs Explaining Upper-Secondary School Students' Orientation towards Biology-Related Careers. The aim of the

study was to discover the contribution of students' interest in school Biology, as well as their self-efficacy and attitudes towards different science subjects and mathematics when explaining students' orientation towards Biology-related careers at upper-secondary school. The data of 321 K-11 students (49% women) were analyzed. Human Biology and gene technology was the most interesting topics of Biology among the students. The students' attitudes and self-efficacy beliefs in science subjects should be taken into account in secondary school Biology education, because gender stereotypes and low self-efficacy beliefs may affect students' future career plans.

Biswal (2016) conceptualized Self-Efficacy as varying along three dimensions: level, strength, and generality. Level refers to the degree of difficulty of the behaviors or tasks that an individual feels capable of performing. Strength refers to the confidence a person has in his or her performance estimates. Weak Self-Efficacy expectations are easily modified by confirming experiences, while strong Self-Efficacy percepts are robust, promoting persistence in the face of obstacles.

Generality of Self-Efficacy concerns the range of situations in which an individual considers him or herself to be efficacious (Komarraju, M. & Nadler, 2017). Self-Efficacy theory states that the level and strength of Self-Efficacy will determine several things. For example, whether or not behavior will be initiated, how much effort will result, and how long the effort will be sustained in the face of obstacles are all determined by Self-Efficacy. Self-Efficacy provides individuals with the ability to influence their own course of action and alter their environments.

Research on self-efficacy and academic achievement in Biology has been limited, particularly in the context of senior secondary school students in Nigeria. Studies have not adequately explored the relationship between self-efficacy and academic achievement in Biology among this population, and more specifically, in the Calabar Education Zone of Cross River State. Additionally, there is a need for further investigation into the role of self-efficacy in influencing students' motivation, interest, and attitude towards Biology, and how these factors ultimately impact their academic achievement in the subject.

Adekunle and Femi-Adeoy (2019) carried out a study on Students' Attitude and Interest as Correlates of Students' Academic Performance in Biology in Senior Secondary School in Ekiti State, Nigeria. Students for the study were two hundred (200) SS II Biology students randomly drawn from five secondary schools in Ado Local Government Area of Ekiti State. The research design adopted was descriptive survey research. The findings showed that there is significant relationship in the students' attitude to Biology and students' academic performance in Biology,

and the findings also revealed that there is significant relationship in the students' interest in Biology and students' academic performance in Biology.

Uitto, Juuti, Lavonen and Meisalo (2017) carried out a study on Students' interest in Biology and their out-of-school experiences. According to the authors interest in Biology and the out-of-school experiences of secondary school pupils (n=3626, median age 15) were surveyed in the spring of 2003 using the international questionnaire. Likert-scaled items were categorized with an explorative factor analysis. Thus, to enhance pupils' interest in learning more about Biology and the living environment in general, it is important to put more emphasis on pupils' out-of-school nature experience and their engagement in informal learning in contextual outdoor environments.

Kashyap and Rana (2021) investigated the relationship between personal interest and academic achievement in science among secondary school students in India. the study employed a quantitative research design and utilized a sample of 320 secondary school students selected through stratified random sampling. data were collected using a standardized personal interest questionnaire and students' academic achievement in science was measured using their scores in the secondary school board examination. The data were analyzed using Pearson product-moment correlation coefficient. the results of the study revealed that there was no significant relationship between personal interest and academic achievement in science among the secondary school students. The study concluded that personal interest may not be a significant predictor of academic achievement in science, and therefore, educators and policymakers should focus on other factors that may influence students' academic achievement in science.

Ibenegbu, Nzewi and Aniakwu (2020) carried out a study on stimulating students' interest in Biology using blended teaching approach in Nsukka LGA. Two research questions and two null hypotheses guided the study. The design of the study is Quasi-Experimental design, specifically, pretest-posttest non- equivalent control group design. The sample for this study consists of 82 Biology students in four intact classes in secondary schools in Nsukka Local Government Area of Enugu State, Nigeria. Biology Interest Inventory (BII) was used as instrument for data collection. Result of the study showed that the students learning Biology using the Blended Teaching Approach had a significant increase in their interest scores. The increase in interest score is not gender dependent as both boys and girls had enhanced interest score. The educational implications of the findings were highlighted and the recommendations proffered which includes that Biology teachers should be trained on how best to involve students into group and individual laboratory activity during Biology practical instructions to facilitate students' involvement and interest in Biology. This could be achieved through seminars and workshops for teachers in secondary schools.

Empirical reviews on personal interest and students' academic achievement in science have been limited, particularly in the context of senior secondary school students in Nigeria studying Biology. The existing literature has not adequately explored the relationship between personal interest and academic achievement in Biology among this population, and more specifically, in the Calabar Education Zone of Cross River State. Furthermore, there is a need for further investigation into the factors that influence students' personal interest in Biology, and how this interest impacts their motivation, engagement, and ultimately, their academic achievement in the subject.

Methodology

The study adopted ex-post facto research design, and the study area was the Calabar Education Zone of Cross River State. The population of the study comprised all Senior Secondary School two (SS2) Biology students with a total of 16,104 and a sample of 433 using simple random sampling technique. Two instruments were used for data collection namely: a questionnaire titled Students' Variables Questionnaire (SVQ) and an achievement test tagged "Biology Achievement Test (BAT). While the SVQ was constructed by the researcher, the BAT was adapted from WAEC past questions in Biology. The instruments were validated by three experts, one from measurement and evaluation and two from Biology education, University of Calabar. The reliability coefficient obtained were 0.93 and 0.80 using Kuder Richardson's formula. Data were collected with the help of research assistances. All the research questions and hypotheses were tested at 0.05 level of significance. The statistical tool used for research questions was Mean and standard deviation and hypotheses were, Pearson product Moment correlation, One-way Analysis of Variance (ANOVA).

Results Table

2:

Hypothesis one

There is no significant relationship between Self-concept and students' academic achievement in Biology.

Independent variable: Self-concept

Dependent variable: Academic achievement

Statistical tool: Pearson product Moment correlation

The hypothesis was tested with Pearson Product moment Correlation statistic since the independent and dependent variables were continuously scored. The results are shown in Table 2.

As shown in the table 2, the calculated correlation coefficient is $-.073$. The significance level of the calculated r value which is $.128$ is far greater than $.05$ significance level at 431 degrees of freedom. This means that the calculated r value is not statistically significant. In other words, the observed negative relationship between students' self-concept and academic achievement in Biology is not statistically significant. Therefore, the null hypothesis is retained.

TABLE 2

Summary of Pearson Product Moment Correlation between students' self-concept and academic achievement in Biology

Variables	Mean		R	Sig. level	Academic Achievement
		$\sum y^2$			38.032
Self-concept	21.781	6.610	18872.157		8.078
			-1690.928	-.073*	.128
		SD	$\sum X^2$	$\sum xy$	

* $P > .05$ df = 431

Hypothesis two

There is no significant relationship between Self-efficacy and academic achievement in Biology.

Independent variable: Self-efficacy

Dependent variable: Academic achievement

Statistical tool: Pearson product Moment correlation

Summary of Pearson Product Moment Correlation between students' self-efficacy and academic achievement in Biology.

Table 3

Summary of Pearson product Moment correlation between students' self-efficacy and academic achievement in Biology

Variables	Mean		r	Sig. level	*p < .05 df = 431
		(Σy^2)			
Self – efficacy	18.942	6.466	18059.557		
					The results in Table 3
			-0.6475192	-.287* .000	
Academic Achievement	38.032	8.078	28187.547		

SD ΣX^2 Σxy
 indicate that the calculated correlation coefficient is -.287 with an associated significance level of .000, which is less than the critical significance level of .05 at 431 degrees of freedom. This implies that the observed negative relationship between students' self-efficacy and their academic achievement in Biology is statistically significant. Therefore, the null hypothesis is rejected. That is, there is a significant relationship between students' self-efficacy and their academic achievement in Biology

Discussions of findings

The result of data analysis of hypothesis one indicated that there is a negative and small relationship between students' self - efficacy and their academic achievement in Biology. The negative relationship means that as students' self-efficacy increases, their academic achievement decreases and vice versa. Also, the result of data analysis in hypothesis three indicated that there is a significant negative relationship between students' self-efficacy and their academic achievement in Biology. Therefore, the null hypothesis is rejected.

This result is in line with the study of Schunk (2016) who stated that once efficacy beliefs are formed, they are not stable. According to the author, they can vary in strength because the individual is constantly evaluating new information. However, once efficacy beliefs have been established over long periods of time and based on a large amount of information, they are unlikely to be changed.

The result equally aligns with Biswal (2016) who conceptualized that self-efficacy to be varying along three dimensions: level, strength, and generality. Level refers to the degree of difficulty of the behaviors or tasks that an individual feels capable of performing. Strength refers to the confidence a person has in his or her performance estimates. Weak Self-Efficacy expectations are easily modified by confirming experiences, while strong Self-Efficacy percepts are robust, promoting persistence in the face of obstacles.

The result of data analysis of hypothesis two indicated that there is a negative and small relationship between students' personal interest and their academic achievement in Biology. The negative relationship means that as students' personal interest increases, their academic achievement decreases and vice versa. But, the result of data analysis in hypothesis four indicated that there is no significant negative relationship between students' personal interest and academic achievement in Biology. Therefore, the null hypothesis is retained

These results contradict the findings of Enebechi, (2016) who stated that interest reflects a central feature in the knowledge value system of a learner, meaning that learners' interests are influenced by the value they have for an activity or knowledge. According to the author, interest guides and encourages students to think critically and to keep trying until success is achieved. Interest and achievement correlate in teaching and learning process and have intra influence on each other, high interest improves students' achievement while high achievement promotes interest, and in other hand low interest retards learning and results to poor achievement. Estelami (2018) noted that interest correlates with intelligence and some factors like teaching methods in determining students' academic achievement and when kicked by students results to poor academic achievement and most often students dropping out from school.

Conclusion

Based on the result of the study the following conclusions were reached that there are the intricate relationships between students' academic achievement in Biology. While individual factors like self-efficacy and personal interests showed negligible or non-significant relationships with academic achievement, collective consideration reveals their predictive significance. By recognizing these factors, educators can develop targeted interventions, thereby; ultimately promoting academic excellence in Biology.

Recommendations

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

- 1 Enhancing students' self-efficacy are crucial, given its significant relationship with academic achievement in Biology
- 2 Educators should adopt a holistic approach, considering the interplay between personal and psychological factors, to foster academic excellence in Biology.

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