

## **Emotional Intelligence, Self-Efficacy and Self-Esteem as Predictors of Secondary School Students' Academic Achievement in Biology Anambra State**

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**Abstract:** The study investigated emotional intelligence, self-efficacy and self-esteem as predictors of secondary school students' academic achievement in biology. Four research questions and eight hypotheses guided the study. The correlational survey design was adopted for the study. The population of the study was 63, 325 senior secondary school year two (SS2) biology students in Anambra state. A sample of 2,204 SS 2 biology students was involved in the study. The instruments for data collection were Emotional Intelligence Scale (EIS), Academic Self-Efficacy Scale (ASES) and Self-adapted Esteem Scale (SES) validated by two lecturers in Departments of Science Education and Educational Foundations, from NnamdiAzikiwe University, Awka and one experienced secondary school biology teacher. The students' achievement was obtained from the schools' biology students' diary. The reliability of the instruments was established using Cronbach Alpha which yielded 0.68, 0.80, 0.75 for EIS, ASES and SES respectively. The data obtained were analyzed using Pearson correlation coefficients and linear regressions. The findings of the study revealed that achievement scores biology was significantly predicted by emotional intelligence and academic self-efficacy except self-esteem. Achievement scores in biology were significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem. The study recommended that orientation exercises should be conducted for students at the beginning of new academic year to access, evaluate and improve their emotional intelligence and self-efficacy with activities bordering on emotions and self-efficacy.

**Keywords:** Emotional intelligence, self-efficacy, self-esteem, achievement, biology

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### **I. INTRODUCTION**

The study of biology has gained wide popularity among secondary school students. The popularity of biology is evident in the enrolling for biology during external examination by students of different disciplines like arts, science or humanities. The common attention given to biology as a subject could be because is a natural subject which enlighten the students on day to day living, their environment, plant and animals as well as their health. Biology is the study of living organism (Akunwa&Obidiwe, 2013). The study of biology and its various branches is applied in various areas of human life, making biology a very important subject for effective human survival.

The importance of biology in national development has necessitated the inclusion of its study in the curriculum of most nations of the world. It is sad to note that secondary school students' academic achievement in biology in Nigeria have remained poor. The poor academic achievement of students in biology is evident in their performance at examinations such as the West African Senior School Certificate Examination (WASSCE) and National Examination Council (NECO). Evidence from the West African Examination Council's Chief Examiners' Report over the years portray that students' academic achievement have not improve.

Academic achievement are important factors in the teaching and learning of any subject including biology. Academic achievement is the outcome of instruction (Ricarda, Anja& Linda, 2018). It depicts the extent to which the goal of instruction has been achieved both by the teacher and by the students (Spinath, 2012). Analysis of students; performance in WAEC in biology from 2007 till data show fluctuations in the percentage number of students who make credit pass and above. From 2007 to 2012, the percentage of students who made credit pass and above was below 40%. From 2013, there has been slight increase the percentage number of those who passed at credit. However, the rise in percentage does not connote rise the performance since the number of students enrolling for the examination has increased drastically. For instance, in 2013, the percentage number of students who made credit pass and above was 51.73% which approximately 852, 000

students out the total population of students that enrolled for that year. In 2014, 56.17% passed at credit level and above, which is approximately 767, 000 students out of those that enrolled. One can see from the population of the students enrolling for biology that the percentage number of students passing at credit grade and above is still declining.

The problems of poor academic achievement has often been attributed to poor teaching method, non-availability of modern laboratory, and learner's background knowledge (Irede, 2018). The focus of most studies directed toward proffering solution to the problem of poor academic achievement among secondary school students, have continued however, to neglect the role of students' psychological attributes in their academic achievement. Teachers and school counselor pay little or no attention to the place of such attributes as students' emotional intelligence, self-efficacy and self-esteem and their roles in the academic achievement students in learning.

Emotional intelligence (EI), according to (Lorna, 2018) is a cross-section of integrated emotional and social capabilities and skills that regulate how successfully people recognize and express their emotions, recognize others feelings and relate with them, and handle daily stresses or pressures, effectively. Earliest literature on EI stresses that it is a significant indicator of future achievement in every walk of life as well as academic achievement and career success. Pioneer authors on EI like Daniel Goleman noted that it predicted academic success than Intelligent Quotient (IQ).

The understanding of how these emotional sensors and their use influence academic achievement on the long run has not yet been fully understood. Thus, there is the need to further investigate how emotional intelligence could predict the academic achievement of secondary school students particularly those in biology. The need for such study is further necessitated by the notion that adolescent students in the secondary school with low emotional intelligence probably perform poorly and may depreciate further to develop low academic self-efficacy.

Self-efficacy was originated from social cognitive theory which validated a significant interaction between individual, environment, behaviour and cognitive factors (Positive Psychology Program, 2018). Self-efficacy is a belief in one's capabilities to organize and execute the causes of action required to manage prospective situation (Asakereh&Yousofi, 2018). When self-efficacy is tied to academic activities and pursuit, we talk of academic self-efficacy. Academic self-efficacy is the belief that an individual can efficiently perform some academic tasks that usually influence his or her own academic pursuit in a positive way (Adnan &Abdolatif, 2018). It refers to individuals' convictions that they can successfully deliver any academic tasks at designated levels. Academic self-efficacy refers to students' perceptions of their competence to do their classwork (Umesh& Sam, 2018).

Self-efficacy play a great role in determining how an individual feelings and thought motivated themselves, which then ultimately influenced their behaviour and the outcome (Emily, Jody, Pauline & Patricia, 2018). This is why Bandura's theory argued that human behaviour can be predicted by an individual level of confidence in their ability to succeed in specific tasks including academic tasks. Hence, students' academic achievement in particular academic activity may vary based on their self-efficacy. Students with high self-efficacy are intrinsically motivated to pursue any academic task with the disposition and belief that they will succeed unlike those with low self-efficacy (Arcadius, 2018). Low self-efficacy sometimes may degenerate to low self-esteem and frustrate the student.

Self-esteem according to Junyi (2018) refers to the amount of value people give to themselves. Self-esteem reflects an individual's overall subjective emotional evaluation of their own worth. Park and Park (2014) assert that one of the principal factors impinging upon students' performance in school is the level of their self-esteem. They further state that students with low self-esteem tend to develop dissatisfaction with school context, which in turn, affects their learning process. Generally, those who appreciate their ability are more likely to succeed in their task performance than their counterparts with the same ability but less self-esteem (Laurinavicius, 2017). Low self-esteem can also lead to anxiety and depression, which can affect social performance in school setting resulting in eventual depreciation in academic achievement.

These psychological characteristics of students (emotional intelligence, self-efficacy and self-esteem) may also interact in a number of ways to influence students' achievement. Studies are not replete with how the combination of these psychological traits may affect achievement, thus, the need for the present study which seeks to establish the joint prediction of the three variables on achievement. The researcher is poised to conduct this investigation because a student may have high intelligence quotient and be academically brilliant but with the onset of low emotional intelligence, academic achievement may be drastically affected. The issue is further complicated by the fact that negative academic achievement may result in low self-esteem and then degenerate further into low self-efficacy. To understand how these factors may interact and influence students' academic achievement is therefore a worthwhile quest.

## **II. PURPOSE OF THE STUDY**

The purpose of the study was to investigate emotional intelligence, academic self-efficacy and self-esteem as predictors of academic achievement in biology. Specifically, the study determined the:

1. prediction of students' achievement scores in biology by students' emotional intelligence.
2. prediction of students' achievement scores in biology by students' academic self-efficacy.
3. prediction of students' achievement scores in biology by students' self-esteem.
4. joint prediction of academic achievement scores in biology by emotional intelligence, academic self-efficacy and self-esteem.

## **RESEARCH QUESTIONS**

The following research questions guided the study.

1. To what extent does emotional intelligence predict students' academic achievement scores in biology?
2. To what extent does academic self-efficacy predict students' academic achievement scores in biology?
3. To what extent does self-esteem predict students' academic achievement scores in biology?
4. To what extent do emotional intelligence, academic self-efficacy and self-esteem jointly predict students' academic achievement scores in biology?

## **HYPOTHESES**

The following hypotheses were tested at 0.05 level of significance:

1. Achievement scores in biology are not significantly predicted by students' emotional intelligence.
2. Achievement scores in biology are not significantly predicted by students' academic self-efficacy.
3. Achievement scores in biology are not significantly predicted by students' self-esteem.
4. Achievement scores in biology are not significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

## **III. METHOD**

The design adopted for the study was correlational survey. The population of the study is 63, 325 (30, 930 males and 32, 395 females) SS2 biology students. The sample for the study is 2, 304 SS2 biology students obtained through a multi-stages sampling procedure. The instruments for data collection are Emotional Intelligence Scale (EIS), Academic Self-Efficacy Scale (ASES), Self- adapted Esteem Scale (SES), Biology and Schools' Biology Students' Diary. The Emotional Intelligence Scale (EIS) was from the Indigenous Emotional Intelligence Scale Developed by Olukayode (2017). The scale was a combination of Bar-on (1997) and Goleman's (1995) models of emotional intelligence. The scale has 40 items. Academic Self-Efficacy Scale (ASES) was adapted from the Academic Self-Efficacy Scale developed by Abdul and Mohammed (2006) from Bandura's theory on self-efficacy. ASES is a 40 item scale designed on a five point scale ranging from 1- "Exactly true", through 2- "Nearly true", 3- "Neutral", 4- "Nearly False", and 5- "Exactly False". Self-Esteem Scale (SES) was adapted from Okwaraji, Nduanya, Obiechina, Onyebueke and Okorie (2018) who re-validated, established the reliability and used the Rosenberg Self-Esteem Scale (RSES) among Nigerian secondary school students. SES is consists of 10 item designed on four point scale. The scale ranged from 4- "strongly agree", through 3- "agree", 2- "Disagree" to 1- "strongly disagree". Schools' Biology Score Diary was a diary book to which the biology teachers in each school records their students' academic achievement in biology each term. The score inventory of the students for three terms was used to gather information on the students' biology academic achievement.

The instruments were validated by two lecturers from the Department of Science Education and the Department of Educational Foundations respectively, with one experienced biology secondary school teachers. The reliability of instruments was established using Cronbach's Alpha. The instruments were administered to 30 students in Ogidi Education Zone. The scores generated were subject to Cronbach's Alpha computation. The reliability coefficient obtained for EIS, ASES and SES was 0.68, 0.80 and 0.75 respectively. The instrument was administered to the students through the help of six research assistants. Data generated from the study were analyzed using simple linear and multiple regressions. The null hypotheses were tested at 0.05 level of significance and the following decision rule: reject the null hypothesis whenever Pvalue is less than 0.05 ( $P < 0.05$ ), do not reject null hypothesis whenever Pvalue is greater than 0.05 ( $P > 0.05$ ).

**IV. RESULT**

**Research Question 1:** To what extent does emotional intelligence predict students' academic achievement scores in biology?

**Table 1: Model Summary on the Extent of Prediction of Students' Achievement in Biology by Emotional Intelligence**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error	Decision
1	.090 <sup>a</sup>	.008	.008	14.563	Low positive relationship

a. Predictors: (Constant), Emotional Intelligence

Table 1 shows a low positive relationship (R = 0.090) between students' emotional intelligence and their achievement in biology. The R-Square value of 0.008 indicates that 0.8% of the variance in biology scores is predicted by emotional intelligence.

**Research Question 2:** To what extent does academic self-efficacy predict students' academic achievement scores in biology?

**Table 2: Model Summary on the Extent of Prediction of Students' Achievement in Biology by Academic Self-Efficacy**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error	Decision
1	.105 <sup>a</sup>	.011	.011	14.542	Low positive relationship

a. Predictors: (Constant), Self-efficacy

Table 2 shows a low positive relationship (R = 0.105) between students' academic self-efficacy and their achievement in biology. The R-Square value of 0.011 indicates that 1.1% of the variance in biology scores is predicted by academic self-efficacy.

**Research Question 3:** To what extent does self-esteem predict students' academic achievement scores in biology?

**Table 3: Model Summary on the Extent of Prediction of Students' Achievement in Biology by Academic Self-Esteem**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error	Decision
1	.008 <sup>a</sup>	.001	.000	14.622	Low positive relationship

a. Predictors: (Constant), Self-esteem

Table 3 shows a low positive relationship (R = 0.008) between students' self-esteem and their achievement in biology. The R-Square value of 0.001 indicates that 0.1% of the variance in biology scores is predicted by academic self-esteem.

**Research Question 4:** To what extent do emotional intelligence, academic self-efficacy and self-esteem jointly predict students' academic achievement scores in biology?

**Table 4: Model Summary on the Extent of Prediction of Students' Achievement in Biology Jointly by Emotional Intelligence, Academic Self-Efficacy and Self-Esteem**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error	Decision
1	.110 <sup>a</sup>	.012	.011	14.539	Low Positive Relationship

a. Predictors: (Constant), Self-esteem, Self-efficacy, Emotional Intelligence

Table 4 shows a low positive relationship (R = 0.110) among students' emotional intelligence, academic self-efficacy, self-esteem and their achievement in biology. The R-Square value of 0.012 indicates that 1.2% of the variance in biology scores is jointly predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

**Hypothesis 1:** Achievement scores in biology are not significantly predicted by students' emotional intelligence.

**Table 5: Regression ANOVA on Significance of Students' Emotional Intelligence Prediction of Achievement in Biology**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3984.807	1	3984.807	18.788	.000 <sup>b</sup>
	Residual	488241.677	2302	212.095		
	Total	492226.484	2303			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Emotional Intelligence

Table 5 shows that at 1df numerator and 2303df denominator, the F-value is 18.788 with a Pvalue of .000 which is less than 0.05. The null hypothesis was rejected. Therefore, achievement scores in biology are significantly predicted by students' emotional intelligence.

**Hypothesis 2:** Achievement scores in biology are not significantly predicted by students' academic self-efficacy.

**Table 6: Regression ANOVA on Significance of Students' Academic Self-Efficacy Prediction of Achievement in Biology**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	5395.592	1	5395.592	25.513	.000 <sup>b</sup>
Residual	486830.892	2302	211.482		
Total	492226.484	2303			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-efficacy

Table 6 shows that at 1df numerator and 2303df denominator, the F-value is 25.513 with a Pvalue of .000 which is less than 0.05. The null hypothesis was rejected. Therefore, achievement scores in biology are significantly predicted by students' academic self-efficacy.

**Hypothesis 3:** Achievement scores in biology are not significantly predicted by students' self-esteem.

**Table 7: Regression ANOVA on Significance of Students' Self-Esteem Prediction of Achievement in Biology**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	32.466	1	32.466	.152	.697 <sup>b</sup>
Residual	492194.018	2302	213.811		
Total	492226.484	2303			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-Esteem

Table 7 shows that at 1df numerator and 2303df denominator, the F-value is .152 with a Pvalue of .697 which is greater than 0.05. The null hypothesis was not rejected. Therefore, achievement scores in biology are not significantly predicted by students' self-esteem.

**Hypothesis 4:** Achievement scores in biology are not significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

**Table 8: Regression ANOVA on Significance of Students' Emotional Intelligence, Academic Self-Efficacy and Self-Esteem Prediction of Achievement in Biology**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	6006.083	3	2002.028	9.470	.000 <sup>b</sup>
Residual	486220.402	2300	211.400		
Total	492226.484	2303			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-esteem, Self-efficacy, Emotional Intelligence

Table 8 shows that at 3df numerator and 2303df denominator, the F-value is 9.470 with a Pvalue of .000 which is less than 0.05. The null hypothesis was rejected. Therefore, achievement scores in biology are significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

Since there was a significant joint prediction by the predictor variables of achievement in biology, the regression values for predicting the criterion variable is presented in Table 9.

**Table 9: Regression Coefficient on Students' Emotional Intelligence, Self-Efficacy and Self-Esteem Prediction of Achievement in Biology**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	59.765	4.958		18.107	.000
Emotional Intelligence	.123	.076	.113	1.621	.105
Self-efficacy	.239	.078	-.213	-3.049	.002
Self-esteem	.042	.088	.010	.478	.633

a. Dependent Variable: Achievement

The regression equation for the prediction of achievement score in biology therefore is:

$$\text{Achievement in Biology} = 59.765 + .123(\text{Emotional Intelligence}) + .239(\text{Academic Self-efficacy}) + .042(\text{Self-esteem})$$

## V. DISCUSSION

The findings of the study showed that emotional intelligence is a significant predictor of achievement in biology. EI enable students to recognize their own emotions and those of others discern between different

feelings and label them appropriately; use emotional information to guide thinking and behaviour, and manage and/or adjust emotions to adapt to environments or achieve academic goals. Thus, students with high emotional intelligence can fathom when best to relate to their teachers and fellow students regarding their academic difficulties and get the best response. Such EI abilities help students to know when their fellow students are in the mood to offer academic help and other such assistance need for them to accomplish any given academic task. The findings of the study support that of Song, Huang, Peng, Law, Wong and Chen (2010) that EI is of course a strong predictor of academic success. The findings of the study also lend credence to the findings of Amalu (2018) that there is positive relationship between emotional intelligence and academic performance. The finding of the study contradicts that of Lorna (2018) that there is no relationship between emotional intelligence and academic performance in mathematics of the elementary pupils.

The findings of the study showed that academic self-efficacy is a significant predictor of achievement in biology. The result of the study is better explained by the self-efficacy theory by Bandura, that self-efficacy reflects confidence in the ability to exert control over one's own motivation, behaviour, and social environment. The confidence or belief of a student in his or her ability to complete an academic task in the first instance incites the students' motivation to pursue the academic activity. Such motivation gives the student a better feeling and control over their academic pursuit. Academically self-efficacious students have a positive feeling and such positive feeling drives the motivation to accomplish academic activities and with the motivation to accomplish more. The finding of the study is in line with the findings of Victor and Abdulwahid (2018) that academic self-efficacy directly predicts learning outcome. The finding of the study also support the findings of Uchida, Michael and Mori (2018) that success-induced students raised their self-efficacy and the elevated self-efficacy persisted for as long as one year and significantly improved academic achievement.

The findings of the study revealed that self-esteem is not a significant predictor of achievement in biology. The result of the study can be attributed to the fact that students of low self-esteem often shrink back from academic activities that prove challenging. As Dev and Ququieh (2016) noted, low self-esteem is linked to violence, school dropout rates, teenage pregnancy, suicide, and low academic achievement. Low self-esteem increases behavioural problems and reduces the connections between peers who could help each other to improve academic achievement. The findings of the study contradicts that of Effiong and Bassey (2018) that self-esteem directly and significantly influenced academic performance. The findings of the study contradict that of Pezhman and Abbas (2018) that a significant relationship was observed between self-esteem and academic achievement of all students.

## **VI. CONCLUSION**

The study concluded that emotional intelligence and academic self-efficacy are significant predictors of achievement in biology. The study also establishes that emotional intelligence, academic self-efficacy and self-esteem together are significant predict of achievement in biology.

## **VII. RECOMMENDATIONS**

The following recommendations are made in the light of the findings of the study:

1. Orientation exercises should be conducted for students at the beginning of new academic year to access, evaluate and improve their emotional intelligence and self-efficacy with activities bordering on emotions and self-confidence.
2. Teachers of biology should manage their classroom in such a way that students employ their emotional faculties in the process of learning so as to maintain a high level emotional intelligence.

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