

Academic Resilience as a Predictor of Secondary School Students' Achievement in Biology in Onitsha Education Zone

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Abstract: *The study examined academic resilience as a predictor of secondary school students' academic achievement in biology in Onitsha Education Zone. Two research questions guided the study and two hypotheses were tested. The design of the study was correlational survey. The population of the study was 5,512 senior secondary school year two (SS2) students offering biology in Onitsha Education Zone out of which 1,200 students was sampled using a multi-stage sampling procedure. Academic Resilience Scale (ARS) validated by three experts was used for data collection. The reliability of the instrument was established using Cronbach Alpha to be 0.84. The students' achievement scores in Biology for two most recent terms were obtained from the teachers' diary. Data obtained from the study were analyzed using simple and multiple linear regressions. The findings of the study revealed that 0.1% of the variance in achievement in biology was predicted by students' academic resilience. Also, achievement scores in biology were significantly predicted by students' academic resilience. The study concluded that academic resilience is a significant predictor of achievement in biology. It was recommended that teachers and school counselors should be available at all time to attend to students facing challenges especially when it is affecting their academic achievement and also when they seek guidance and other such helps or need them.*

Keywords: *academic, resilience, biology, achievement, predictor*

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I. Introduction

Biology is one the subject offered by both arts and science students at the secondary school level. Often time there is eagerness among students to understand and pass the subject given the fact that it is important in daily living and furtherance of studies because Biology cuts across all disciplines. The urge to understand and pass Biology which is understood to be 'subject for all' requires resilience on the part of the students. This is because the Chief Examiner Reports shows that over the years, students' achievement in Biology has not significantly improved.

These incessant appalling notes that follow students' achievement in Biology in external examinations leaves one to think that students suffer some academic challenges that requires academic resilience. These thoughts about the students' achievement in Biology therefore, instigate the need to empirically investigate the predictive association between academic resilience and achievement in biology.

Resilience generally refers to psycho-social process of coping with life adversity in such a way that the development and functioning of an individual maintain normal or even surpass general expectations (Novotny & Kremenkova, 2016). Academic resilience is the ability to effectively deal with setback, stress or pressure in the academic setting. According to Cassidy (2016), academic resilience psychological construct observed in some individuals that accounts for success despite adversity. Academic resilient students bounce back to beat the odds. Therefore, it is considered an asset in human characteristic terms. Academic resilient students successfully deal with academic drawbacks, challenges and academic pressure (grades, exam pressure), stress and difficulties in the academic or school life (Ebulum & Chidiobi, 2016). According to Challen, Machin and Gillham (2014), are intrinsically motivated, optimistic, self-regulated, flexible, show agency toward being solution-focused, reciprocity, assertive, exercise and possess determination and good communication skills.

Academic resilience is also a multi-dimensional variable comprised of such dimensions like perseverance, reflective and adaptive help-seeking and negative affect and emotional response (Cassidy, 2016). Perseverance represent those traits, characters, and reactions of students such as hard work and effort, failure to adhere to weaknesses, adherence to plans and goals, acceptance and use of feedback, innovative problem solving skills and ability to see hardship as opportunities. The component of negative affect and emotional response refer to traits, characters and reactions such as being catastrophic and avoiding negative responses.

Cassidy further explained that reflecting and adaptive help-seeking reflect a set of traits, characters and reactions of students that reveal strengths and weaknesses. This they manifest by changing study methods, seeking help, support and encouragement, monitoring their efforts and achievements. However, the extent to which academic resilience predicts students' achievement in biology is not well understood. Again, literature is not replete with the information on how the different dimensions of academic resilience predict academic achievement scores in biology. The need therefore arises to empirically establish the prediction power of the different dimensions of academic resilience.

II. Purpose Of The Study

The purpose of the study is to investigate academic resilience as a predictor of secondary school students' achievement in Biology. Specifically, the study determined the:

1. extent to which academic resilience predict students' achievement scores in Biology.
2. contribution of the individual dimensions of academic resilience (perseverance, reflective and adaptive help-seeking, negative affect and emotional response) in the prediction of students' achievement scores in Biology.
- 3.

III. Research Questions

The following research questions guided the study.

1. To what extent does academic resilience predict secondary school students' achievement scores in Biology?
2. What are the contributions of the individual dimensions of academic resilience (perseverance, reflective and adaptive help-seeking, negative affect and emotional response) in the prediction of secondary school students' achievement scores in Biology?

IV. Hypotheses

The following hypotheses were tested at 0.05 level of significance.

1. Academic resilience is not a significant predictor of secondary school students' achievement scores in Biology.
2. The individual dimensions of academic resilience (perseverance, reflective and adaptive help-seeking, negative affect and emotional response) are not significant predictor of secondary school students' achievement scores in Biology.

V. Method

Research Design

The study adopted the correlational survey design. Correlational survey studies seek to establish what relationship exists between two or more variables (Nworgu, 2015). According to Salkind (2010) correlational designed studies can be relational (leading to correlation analysis) and predictive (leading to regression analysis). However, correlational studies that are predictive are used in those cases when there is an interest to identify predictive relationship between the predictor and the outcome/criterion variable. The synonym of correlation is "association", and it is referred to the direction and magnitude of the relationship between two variables. This association cannot be used to draw conclusions with regard to cause-effect relationship between the variables. The design is therefore appropriate for the study whereas the study sought to establish the existence, coefficient of determination, prediction power, strength/magnitude and direction of the relationship between the predictor variable academic resilience and the outcome variable academic achievement in Biology.

Area of the Study

The area of the study is Onitsha Education Zone of Anambra state. The capital and seat of government in the state is Awka. It is a state in southeastern Nigeria. The indigenous ethnic groups in Anambra state are the Igbo and a small population of Igala, who live mainly in the north-western part of the state. Anambra state amidst her rich natural gas, ceramics and crude oil has many other resources in terms of agro-based activities such as fisheries and farming, as well as land cultivated for pasturing and animal husbandry. Educationally, Anambra is a centre of excellence. The state's theme is "Light of the nation", formerly known as the "Home for all". Literacy rate in the state is comparatively high compared to other states. Primary and secondary school enrollment in the state is one of the highest in the country. The six education zones are: Aguata, Awka, Ihiala, Nnewi, Ogidi and Onitsha with 256 secondary schools scattered over the Education Zones. Onitsha, a historic port city from pre-colonial times is the largest urban area in the state.

Population of the Study

The population of the study is 2,337 senior secondary school year two (SS2) Biology students in Onitsha Education Zone.

Sample and Sampling Technique

The sample for the study is 1,200 Biology students drawn through multistage sampling procedure involving, first, stratifying the secondary schools located in each of the three local government areas in Onitsha Education Zone according to their location. At the second stage, five secondary schools were drawn from each local government area using purposive sampling techniques amounting to a total of 15 schools. The purpose for which the 15 schools were drawn was to ensure that the selected schools are located in different local government areas within the zone to for greater coverage. Finally, in each 15 secondary schools, 80 SS2 Biology students who results are in the teachers' diary will be selected for the study giving a sample size of 1,200 students.

Instrument for Data Collection

The instrument for data collection was Academic Resilience Scale (ARS). Academic Resilience Scale (ARS) is adapted from Cassidy (2016) who developed Academic Resilience Scale (ARS-30), a context-specific construct measure of academic resilience based on student responses to academic adversity. ARS is a 30 scale items designed along a 5-point Likert scale from very much likely through much likely, likely, much unlikely and unlikely. Students will respond to the scale once they have read a short vignette (a brief literary description). The adapted vignette was constructed to portray an example of academic adversity, representing significant academic challenge and struggle as follows: 'You have received your mark for a recent assignment/test and it is a 'fail.' The marks for two other recent assignments/tests were also poorer than you would want as you are aiming to get as good a grade as you can because you have clear career goals in mind and don not want to disappoint yourself, family and peers. The feedback from the teachers for the assignment is quite critical, including reference to 'lack of understanding' and 'poor writing and expression,' but it also includes ways that the work could be improved. Similar comments were made by the teachers who marked your other two assignments/tests'. In the instruments, the word 'tutors' was changed to 'teachers'.

Students will be asked to imagine themselves as the student characterized in the vignette and thus, experiencing academic adversity. Scoring of positively phrased items will be reversed so that a high ARS-30 score indicates greater academic resilience. The adaptation done involved the re-arrangement of the items into the three clusters measured namely: Perseverance, Negative affect and emotional response and Reflective and adaptive help-seeking. The vignette was modified by adding the word 'test', changing the word 'tutor' to 'teacher' wherever they appeared in the vignette. The students' achievement scores in Biology for two most recent terms will be obtained from the teachers' diary and used for the study.

Validation of the Instrument

The purpose of the study, research questions and hypotheses along with the instrument were given to two lecturers from the Department of Science Education and the Department of Educational Foundations and one experienced Biology secondary school teacher for validation. They were required to carefully examine the instrument in terms of clarity of language, sentence structure and items relatedness to the purpose of the study. The validators were also requested to suggest the items they wish the researcher to retain, modify or delete by writing 'R', 'M' and 'D' against them. The corrections and suggestions from the validators were effected in the final copy of the instrument.

Reliability of the Instrument

The reliability of the instrument was established using Cronbach's Alpha. The choice of Cronbach's Alpha for ARS is because the items tare polytomously scored. The instrument was administered to 40 SS2 Biology students outside the study area. The scores generated were collated for each student and the formulae applied respectively to compute the internal consistency of each instrument. The coefficient of internal consistency obtained for ARS was 0.84.

Method of Data Collection

The instrument for the study was administered in two phases with the help of six research assistants who are fellow postgraduate students. The research assistants were briefed on how to administer the instrument with the help of the regular Biology teachers in each school to be used. The researcher and the research assistants obtained the Biology achievement scores of each student from the Biology teachers' diary and use their serial number as a code of the instruments those students were given. The instrument was given to the students by visiting one school per day using on-the-spot method for two weeks. The research assistants returned any collected instrument to the researcher for re-examination, scoring and collation of scores for analysis.

Method of Data Analysis

Data from the study were analyzed using simple and multiple regressions. The interpretation of the correlation coefficient was according the three-way guide for interpreting correlation coefficient values provided by Nworgu (2015) when a large number of pairs of scores have been correlated. The interpretations are as follows: $r = \pm .30$ and below, low relationship; $r = \pm .31$ to below ± 0.80 , moderate relationship and $r = \mp .81$ and above, high relationship. The null hypotheses were tested at 0.05 level of significance. The decision rule was to reject the null hypothesis whenever Pvalue is less than or equal to alpha level of 0.05 ($P \leq 0.05$) and not to reject null hypothesis whenever Pvalue is greater than 0.05 ($P > 0.05$).

VI. Results

Research Question 1: To what extent does academic resilience predict secondary school students' achievement scores in Biology?

Table 1: Extent of Prediction of Students' Achievement in Biology by Academic Resilience

Model	R	R ²	Adjusted R ²	Std. Error	Decision
1	.007 ^a	.001	.001	14.478	Low positive relationship

a. Predictors: (Constant), Academic resilience

Table 1 shows a low positive relationship ($R = 0.007$) exists between students' academic resilience 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 resilience.

Research Question 2: What are the contributions of the individual dimensions of academic resilience (perseverance, reflective and adaptive help-seeking, negative affect and emotional response) in the prediction of secondary school students' achievement scores in Biology?

Table 2: Contributions of the Individual Dimensions of Academic Resilience in the Prediction of Achievement Scores in Biology

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	60.703	5.561		10.916	.000
	Perseverance	.091	.053	.050	1.724	.028
	Negative Affect and Emotional Response	.183	.126	.042	1.451	.047
	Reflective and Adaptive Help-seeking	-.008	.075	-.003	-.111	.008

a. Dependent Variable: Achievement

Table 2 shows the standardized beta coefficient which indicates correlation between variables. The unstandardized beta coefficient which shows the prediction powers of each dimension of academic resilience which indicates their relative contribution to achievement in biology. The table shows that perseverance has a low positive relationship ($R = 0.050$) between with students' their achievement in biology, negative affect and emotional response has a low positive relationship ($R = 0.042$) with achievement in biology, while reflective and adaptive help-seeking has a low positive relationship ($R = 0.003$) with achievement in biology. Perseverance is shown to contribute 0.091 to achievement in biology whenever a students' perseverance increase by one unit. With a unit increase, negative affect and emotional response increases achievement in biology by 0.183, while reflective and adaptive help-seeking increases achievement by 0.008. The order of relative contribution to achievement in biology from the highest to lowest by each dimension of academic resilience is; negative affect and emotional response (0.183), followed by perseverance (0.091) and then reflective and adaptive help-seeking (0.008).

Hypothesis 1: Academic resilience is not a significant predictor of secondary school students' achievement scores in Biology.

Table 3: ANOVA on Significance of Prediction of Achievement in Biology by Students' Academic Resilience

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	13.616	1	13.616	.065	.009 ^b
	Residual	251111.717	1198	209.609		
	Total	251125.333	1199			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Academic Resilience

Table 3 shows that academic resilience is a significant predictor of achievement scores in biology $F(1, 1199) = 0.065$, $P(0.009) < 0.05$. The null hypothesis was rejected. Therefore, academic resilience is a significant predictor of secondary school students' achievement scores in Biology.

Hypothesis 2: The individual dimensions of academic resilience (perseverance, reflective and adaptive help-seeking, negative affect and emotional response) are not significant predictor of secondary school students' achievement scores in Biology.

Data relating to hypothesis 2 is contained in Table 2.

Table 2 shows that perseverance is a significant predictor of achievement scores in biology, $t = 1.724$, $P(0.028) < 0.05$, negative affect and emotional response is a significant predictor of achievement scores in biology, $t = 1.451$, $P(0.047) < 0.05$ and that reflective and adaptive help-seeking is also a significant predictor of achievement scores in biology, $t = 0.111$, $P(0.008) < 0.05$.

Since all the dimensions of academic resilience are significant predictors of achievement scores in biology, the regression equation (model) for the prediction of achievement score in biology by the dimension of academic resilience therefore is:

$$\text{Achievement in Biology} = 60.703 + .091(\text{Perseverance}) + .183(\text{Negative Affect and Emotional Response}) + .008(\text{Reflective and Adaptive Help-seeking})$$

VII. Discussion

The study revealed that low positive relationship between students' academic resilience and their achievement in biology with academic resilience predicting 0.1% of the variance in biology scores. Negative affect and emotional response, perseverance and reflective and adaptive help-seeking significantly contributed to achievement in biology with negative affect and emotional response having the highest contribution. Academic resilience was also shown to be a significant predictor of achievement in biology. Academic resilience enables a student to deal successfully with setbacks, academic stress and pressure without any negative impact on their achievement. When adversity sets in, a student who allows the negative effect of such time to get to them begins to respond negatively to the situation and the end result is poor achievement.

Achievement on the other hand can be improved when a student perseveres in the face of adversities including academic stress and challenges. The students begin to work hard and put in every effort to ensure they pass their tests and examination. The students who persevere are often those who adhere to academic plans and goals and who develop innovative skills to tackle problems while seeing academic challenges and hardship as opportunities. They begin to reflect on the opportunities they see in their challenges and tend to find ways to overcome them and where possible seek the help of friends, classmates and teachers. They have patience and are socially competent and therefore, know who and who to meet to help them solve their problems and overcome academic challenges.

The finding of the study contradicts the finding of Zina (2016) that a statistically significant positive relationship between resiliency and reading achievement but no relationship between resiliency and GPA as well as resiliency and math achievement. The finding of the study also contravenes the finding of Sheila (2019) that there was no significant relationship between the respondents' academic resiliency and academic performance. The finding of the study supports the finding of Syprine, Peter and Theresia (2018) that revealed a negative statistical correlation between academic resilience and academic. The finding of the study is in line with the finding of Majid (2018) that academic resilience is significantly correlated with academic achievement.

VIII. Conclusion

The study concludes that academic resilience is a significant predictor of achievement in biology. It is also concluded from the study that academically resilient students will attain better academic achievement despite academic adversities and challenges.

IX. Recommendations

In line with the findings of this study, the following recommendations are made:

1. Teachers and school counselors should be available at all time to attend to students facing challenges especially when it is affecting their academic achievement and also when they seek guidance and other such helps or need them.
2. Orientation exercises should be organized for secondary school students by school administrators on how to face academic challenges.

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