UNIJERPS
Unizik Journal of Educational Research and Policy Studies VOL.16 (2);
https://unijerps.org
2021 Impact Factor: 5.641; 2020 Impact Factor: 5.355.
July-December, 2023
Indexing and Impact Factor URL: http://sjifactor.com/passport.php?id=21363

MOTIVATION AND SELF-ESTEEM AS PREDICTORS OF SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN BIOLOGY IN AWKA EDUCATIONAL ZONE OF ANAMBRA STATE

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ABSTRACT
The study investigated motivation and self-esteem as predictors of secondary school students' achievement in Biology in Awka Education Zone of Anambra State. A correlational design was adopted for the study. The population of the study comprised 3,407 senior secondary two (SS2) Biology students in 62 government secondary schools in Awka Education Zone of Anambra State. The sample size for the study was 345 SS2 Biology students. Multistage sampling procedure was used to draw the sample for the study. Three instruments were used for data collection. The instruments include: Biology Motivation Questionnaire (BMQ), Self-Esteem Scale (SES) and Biology Achievement Test (BAT). The face and content validation of these instruments were done by three experts. The reliability of BMQ and SES items were determined using Cronbach alpha formula which gave reliability coefficients of 0.89 and 0.85 respectively, while that of BAT was done using Kuder Richardson 20 (K-R-20) to obtain a reliability index of 0.95. The Research questions were answered using Pearson product moment correlation coefficient (r), coefficient of determination (r^2) and Hayes Process while the hypotheses were tested using regression ANOVA and Hayes Process at 0.05 level significance. The findings of the study revealed that motivation has a positive and significant prediction on students' achievement in Biology. Also, Self-esteem is a significant predictor of students' achievement in Biology. Based on the findings of the study, it was recommended among others that Biology teachers should create an appropriate classroom environment for students and adopt good teaching strategies that would nurture and enhance high motivation among them, drive to achieve and the ability to improve their self-esteem.

Keywords: Motivation, Self-esteem, Biology and Achievement

Introduction
Science is the concerted human effort to better understand the history of the natural world and how the natural world works with observable physical evidence as the basis of the understanding. It is a knowledge acquired through observation of natural phenomena, and experimentation that tries to simulate natural processes under controlled conditions. Through such inquiry, knowledge, attitude and skills about the nature and natural phenomena which help in solving real life problems are acquired. Science according to Bradford and Hamer (2022) is a body of knowledge which uses a systematic and logical approach in

discovering things in the universe. Hence, scientific inquiry helps in the acquisition of scientific knowledge.

Scientific knowledge helps us to explain the world around us. Through the application of the knowledge of science, diseases can be treated and controlled either through vaccines or drugs; environmental interventions as a result of science have helped man make maximum impact for better living using the needed resources (Nishi & Chmiola, 2017). Therefore, science helps to improve the quality of life of the average individual and the economic, health and security of a nation and serves as a tool for industrialization and national development. Science is divided into three main branches namely; Biology, Chemistry and Physics.

Biology is a natural science that refers to the study of living and non-living things. According to Ihekwoaba, et al (2020), Biology is a branch of natural science that deals with the study of living organisms, the structures, functions, evolutions, distribution and interrelationships. Ihekwoaba, et al (2020) further stressed that Biology encompasses diverse fields, including botany, conservation, ecology, evolution, genetics, marine biology, medicine, microbiology, molecular biology, physiology, and zoology which are helpful in improving the quality of life in human. This shows that Biology is very important for proper functioning of not just an individual, but the society at large.

In spite of the importance of Biology, empirical evidences have shown that students' achievement in subject has been poor. For instance, Adewale, et al (2016) and Ihekwoaba Chinweuba-Eze and Nduji (2020) acknowledged the general poor achievement of students in Biology. Moreover, the West African Examination Council (WAEC) Chief Examiner's Reports (2014-2018) showed that the percentage credit pass of students' achievement in Biology were 56.17%, 57.42%, 61.68%, 55.57% and 55.10% respectively. This indicates that there is need for improvement of students' achievement in Biology.

Some studies have suggested reasons why students achieve poorly in Biology. For instance, Ndayambaje, et al (2021) opined that students' poor achievement in Biology can be linked to their school environment, inappropriate teaching methodology, insufficient laboratory equipment, English language as medium of instruction, inadequate involvement of parents in learners' education, insufficient teaching and learning materials, amount of content and time allocated, poverty and students' absenteeism. Allawan (2021) also found that teaching approach/strategy, learning resources, student-related factors and teacher's motivation are some of the factors that affect students' achievement in Biology. According to Antonio et al (2017), self-esteem, self-efficacy, emotional intelligence, hope or motivation, among other variables are important psychological variables in an academic context. Therefore, students' personal characteristics variables such as motivation, self-esteem and ways of learning are important factors that could influence their achievement in a given school subject especially in Biology.

Motivation is the thrust that moves individuals in achieving a stated life goal. Motivation is defined as the biological, emotional, social, and cognitive forces that initiates, guides, and maintains goal-oriented

behaviours (Cherry, 2022). Operationally, motivation is that which can be biological and/or environmental that propels students' desire in achieving their goal. Motivation helps to improve the persistence, achievement and engagement level of a learner in a course. For that reason, the motivation element in education cannot be neglected. Motivation has been categorized into two main forms which are intrinsic and extrinsic motivation. Intrinsic motivation is related to the inner force of behaviour, such as want or desire. People who are intrinsically motivated do things due to their innate interest for self-satisfaction and fulfilment (Rohana, 2021). On the contrary, extrinsic motivation refers to the desire that is externally motivated. It comes out of factors such as family expectations and pressures, educational environment and teachers, and workplace responsibilities. In this study, both forms of motivation will be compositely studied, since, Naz et al (2020) stated that they are not essentially independent or exclusive and are overlapping and are often interdependent.

Extant literature by Linnenbrink-Garcia et al., (2018) and Sikhwari (2014) opined that there exist significant correlation between students' motivation and their academic achievement. Moreover, Izuchi and Onyekuru (2017) found that academic self-concept, academic motivation and academic achievement correlated significantly with one another. Hence, Izuchi and Onyekuru (2017) concluded that motivational factors have crucial roles in academic achievement and since academic achievement of students is related to social development, it is essential that attention should be paid to the components of academic motivation. On the contrary, Tolero and Echaure (2021) found that there was no significant relationship between dimensions of motivation and students' achievement. From the foregoing, studies on the prediction of motivation and students' achievement showed inconsistent results. Moreover, regardless of much research on motivation and students' achievement in school subjects, there is a dearth of literature on the prediction of motivation on students' achievement in Biology, in Awka Education Zone of Anambra State. In addition to motivation, students' self-esteem could play an important role in the academic achievement of Biology students in secondary schools.

Self-esteem is used to describe a person's overall subjective sense of personal worth or value. Self-esteem according to Ackerman (2018) refers "to a person's overall sense of his or her value or worth". It is the subjective measure of a person's values or worth that one believes one has as an individual. Therefore, self-esteem is an important influential predictor of various outcomes, such as academic achievement and behaviour. Operationally, self-esteem can be defined as an individual's assessment of himself/herself based on their personal thoughts and environmental influences. Thus, self-esteem could be low or high. Low self-esteem can be seen as a major factor in abuse, addiction, crime, depression, loneliness, low educational achievement, mental illness and unhappiness while high self-esteem students are often creative, joyful, fun to be with and productive which could influence their achievement.

Studies by Haddad and Noori (2018) and Doodman et al (2017) posited that academic achievement and self-esteem are

positively and significantly correlated. Studies among university students reveal a significant relationship between self-esteem and academic achievement (Akram & Suneel, 2018; Arbabisarjou, et al, 2016). However, Wibowo (2016) found a significant but weak correlation between self-esteem and academic achievement. Although many studies have been done on the relationships between self-esteem and students' achievement, similar studies are very limited in Nigeria especially among secondary school Biology students in Awka Education Zone of Anambra State, this lack of literature and contradictions in findings necessitated this empirical study.

Research Questions

The following research questions guided the study.

1. What is the predictive value of motivation on achievement of Biology students in secondary schools?
2. What is the predictive value of self-esteem on achievement of Biology students in secondary schools?

Hypotheses

The following null hypotheses guided the study and were tested at 0.05 level of significance.

HO_1: Motivation does not significantly predict achievement of Biology students in secondary schools.

HO_2: Self-esteem does not significantly predict achievement of Biology students in secondary schools.

Research Method

The study adopted a correlational research design. The population of the study comprised 3,407 senior secondary two (SSII) Biology students in the 62 public secondary schools in Awka Education of Anambra State. The sample size of the study was 345 SSII Biology students. This was done using the Kothari (2004) formula of sample determination. Multistage sampling procedure was used to draw the sample size. Firstly, purposive sampling was used to select 10 co-educational schools Awka Education Zone while simple random sampling by balloting without replacement was used to draw the sample size used for the study. The instruments for data collection were the Biology Motivation Questionnaire (BMQ), Self-Esteem Scale (SES) and Biology Achievement Test (BAT). The Biology Motivation Questionnaire (BMQ) was adapted from the Science Motivation Questionnaire II (SMQ II) which was developed by Glynn et al (2011). The BMQ was a four point likert scale with 25 items. The Self-Esteem Scale (SES) which consisted of 10 items was adapted from Rosenberg Self-Esteem Scale (RSES) developed by Rosenberg (1965), whereas the Biology Achievement Test (BAT) consisted of 35 multiple-choice questions developed by the researchers. The scores of the SES and BAT were converted to 100 percentages to standardize them, since, the numbers of items and the total scores in the two instruments are not equal with that of BMQ. This was to enhance an effective correlation of the variables of the study. The instruments were validated by three experts; one expert from the Department of Science Education, Nnamdi Azikiwe University, Awka and two

experts from the Department of Education Foundations (one expert each from Measurement and Evaluation Unit and Education Psychology Unit), Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State. The estimate of internal consistency of Biology Motivation Questionnaire (BMQ) and Self-Esteem Scale (SES) items were determined using the Cronbach's alpha formula which gave a reliability index of 0.89 and 0.85 respectively while the estimate of internal consistency of BAT was done using Kuder Richardson (K-R-20) and yielded a reliability index of 0.95. The instruments were given to the students by the researchers and immediately collated. Pearson Product Moment Correlation Coefficient (r) and coefficient of determination (r2) were used to answer the research questions. The value of r was interpreted as follows: 0.30 and below = low relationship (correlation), 0.31-0.80 = moderate relationship (correlation), 0.81 and above = high relationship (correlation). Linear regression (Regression ANOVA) was used to test hypotheses at 0.05 level of significance.

Presentation of Results

The results of the study are presentation based on the research questions and hypotheses

Research Question One: What is the predictive value of motivation on achievement of Biology students in secondary schools?

Table 1: Regression Analysis of the predictive value of motivation on achievement of Biology students in secondary schools

Model	r	r^2	Adjusted r^2	Std. Error of the Estimate	Decision
1	.325[a]	.106	.103	5.89223	Moderate Relationship

a. Predictors: (Constant), BMQ

The result in Table 1 shows the predictive value of motivation on achievement of Biology students in secondary schools. It reveals that the correlation coefficient (r) between motivation and students` achievement in Biology is 0.325 indicating a moderate positive predictive value (correlation) with associated coefficient of determination (r^2) of 0.106. This coefficient of determination (r^2) shows that 10.6% of the variance in students' achievement in Biology can be attributed to their motivation while 89.4% of the variance in students' achievement in Biology can be attributed to other variables not considered by this study. To strengthen the above research question, hypothesis one was formulated and tested at 0.05 probability level to determine if motivation is a significant predictor of students' achievement in Biology.

Hypothesis One: Motivation does not significantly predict achievement of Biology students in secondary schools.

Table 2: Analysis of Variance of the Predictive Value of Motivation on Achievement of Biology Students in Secondary Schools

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1405.929	1	1405.929	40.495	.000[b]
	Residual	11908.401	343	34.718		
	Total	13314.330	344			

a. Dependent Variable: BAT
b. Predictors: (Constant), BMQ

The result in Table 2 reveals that motivation is a significant predictor of students' achievement in Biology, F(1, 344) = 40.495, P = .000. Therefore, the null hypothesis which states that Motivation does not significantly predict achievement of Biology students in secondary schools was rejected. This is based on the fact that the p-value of .000 is less than the 0.05 level of significance. This implies that motivation made a significant contribution to the prediction of students' achievement in Biology in Awka Education Zone of Anambra State.

Research Question Two: What is the predictive value of self-esteem on achievement of Biology students in secondary schools?

Table 3: Regression Analysis of the Predictive Value of Self-Esteem on Achievement of Biology Students in Secondary Schools

Model	R	r^2	Adjusted r^2	Std. Error of the Estimate	Decision
1	.233[a]	.055	.052	6.05813	Low Relationship

a. Predictors: (Constant), SES

The result in Table 3 shows the predictive value of self-esteem on achievement of Biology students in secondary schools. It reveals that the correlation coefficient (r) between self-esteem and students` achievement in Biology is 0.233 indicating a low positive predictive value (correlation) with associated coefficient of determination (r^2) of 0.055. This coefficient of determination (r^2) shows that 5.5% of the variance in students' achievement in Biology can be attributed to their self-esteem while 94.5% of the variation in students' achievement in Biology is attributed to other factors. To strengthen the above research question, hypothesis two was formulated and tested at 0.05 probability level to determine if self-esteem is a significant predictor of students' achievement in Biology.

Hypothesis Two: Self-esteem does not significantly predict achievement of Biology students in secondary schools.

Table 4: Analysis of Variance of the Predictive Value of Self-Esteem on Achievement of Biology Students in Secondary Schools

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	725.919	1	725.919	19.779	.000[b]
	Residual	12588.411	343	36.701		
	Total	13314.330	344			

a. Dependent Variable: BAT
b. Predictors: (Constant), SES

The result in Table 4 reveals that self-esteem is a significant predictor of students' achievement in Biology, F(1, 344) = 19.779, P = .000. Therefore, the null hypothesis which states that Self-esteem does not significantly predict achievement of Biology students in secondary schools was rejected. This is based on the fact that the p-value of .000 is less than the 0.05 level of significance. This implies that self-esteem made a significant contribution to the prediction of students' achievement in Biology in Awka Education Zone of Anambra State.

Discussion of Findings

The findings of the study revealed that the predictive value of motivation on achievement of Biology students in secondary schools is moderate and positive. It accounted for 10.6% variance in students' achievement in Biology. Further analysis showed that motivation is a significant predictor of students' achievement in Biology. This indicates that an increase in students' motivation led to a significant increase in their achievement in Biology. It was observed that students were motivated on the mention of the subject. Hence, confirming the reviewed studies in the present study that motivated students are goal oriented and always have the desire to accomplish a task and achieve higher. These findings agree with that of Linnenbrink-Garcia et al., (2018) and Njoki (2018) who averred a significant correlation between secondary school students' motivational beliefs and their academic achievement. Similarly, Izuchi and Onyekuru (2017) found that academic self-concept, academic motivation and academic achievement correlated significantly with one another. The findings also support Deci and Ryan's (1985) self-determination theory which argues that individuals who are intrinsically and extrinsically motivated tend to accomplish a task and undertake goal-oriented behavior to attain a stated objective. Moreover, the finding is in line with Sikhwari (2014) who asserted that there is a significant correlation between university students' motivation scores and their achievement; as well as a a significant relationship between achievement and the self-concept of students. On the contrary, the findings of the present study did not support that of Tolero and Echaure (2021) and Yoo et al (2022) that there was no

significant relationship between dimensions of motivation and students' academic achievement. Also, the findings of the study disagree with that of Othman et al (2011) that weak correlations exist between academic achievement and students' academic motivation.

The findings of the study revealed a low and positive predictive value of self-esteem on achievement of Biology students in secondary schools. It accounted for 5.5% variance in students' achievement in Biology. Further analysis showed that self-esteem is a significant predictor of students' achievement in Biology. This indicates that the higher the students' self-esteem, the higher their achievement in Biology. As observed by the researcher, this could be as a result of the students' better assessment of themselves with respect to Biology and the observed positive feelings among themselves which could influence their academic achievement. The findings of the study shows a similarity with those of Haddad and Noori (2018) and Doodman et al (2017) that academic achievement and self-esteem are positively and significantly correlated. Also, the finding is in line with the work of Sharma and Sharma (2021) which revealed a significant positive relationship between self-esteem and academic achievement of students. The findings also support Braden (1969) theory of self-esteem which argues that individuals can attain their purposes in life, if they have a high/positive evaluation of themselves and interact with their environment, as this will result to a higher self-esteem and invariably a better achievement in Biology. Furthermore, the finding is in consonance with Akram and Suneel (2018) and Arbabisarjou, et al (2016) who revealed that a significant relationship between self-esteem and academic achievement among university students

Conclusion

Based on the findings the researchers concluded that motivation significantly predict achievement of Biology students in secondary schools. Moreover, self-esteem is a significant predictor of students' achievement in Biology.

Recommendations

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

1. Students should be encouraged to foster in them improved motivation and higher self-esteem
2. Biology teachers should create an appropriate classroom environment for students and adopt good strategies that would nurture and enhance high motivation among them, drive to achieve and the ability to improve their self-esteem.
3. The parents should be encouraged to motivate their children for outstanding academic achievement.
4. Adequate counseling services should be provided to the students by their Guidance Counsellors in order to improve their motivation and self-esteem.
5. Seminars and workshops should be organized by the government and education stakeholders on how to improve motivation and self-esteem among Biology students in Awka Education Zone of Anambra State.

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