Psychosocial Variables as correlates of Achievement in Biology among Senior Secondary School Students in Calabar Education Zone of Cross River State, Nigeria

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Abstract

This study investigated psychosocial variables as correlates of achievement in Biology among Senior Secondary School Students in Calabar Education Zone, Cross River State. One hypothesis was formulated to direct the study. Correlational research design was adopted for the study. A sample of 456 Biology students was randomly drawn for the study. The selection was done through stratified simple random sampling technique. The instruments for data collection were the researchers-developed Psychosocial Correlates Scale (PCS) and Achievement Test in Biology (ATB). The instruments were validated by three experts. Cronbach Alpha and Kuder-Richardson formulae were used to establish the reliability of the instruments. Pearson Product Moment Correlation Analysis was the statistical technique adopted to test the hypothesis at .05 level of significance. The results of the analysis revealed that test anxiety and motivation to study biology significantly relate to students' achievement in biology, while self concept, attitude and age do not. Based on the findings of the study, it was recommended, among others, that counsellors should be posted to schools to help students with test anxiety disorder.
Keywords: students, psychosocial, achievement, biology, variables

Introduction

Biology is a branch of science that is concerned with the study of plants and animals, the nature of organisms, and their relationship with one another as well as their environment. As a science subject, it enables one to comprehend major natural cycles that happen inside him. Science is a field which seeks to create logical and critical thinking abilities in a student. The overall objective of science schooling is to furnish the student with the fundamental data, abilities and approach towards carrying on with an efficient and

valuable life, both to himself and the society in which he lives. Offering science subjects at the secondary school level provides students with the opportunity to study a science related discipline in higher institutions of learning, as pass grade in such science subject is a requirement. Observation has shown that in spite of the tremendous advantages of Biology in the society, poor performance of students in Biology continues to linger.

Education is generally accepted as the instrument for bringing about economic, social, political, moral and technological transformations. Idowu (2001) describes education as the pivot on which the wheel of national development revolves, and as a legacy that a nation can bequeath to its citizens. Education, therefore, includes the processes leading to the formation of habits, attitudes and values. According to Akande et al. (2008), education should not merely be seen as a means of transmitting ideas, knowledge and skills, but a tool for influencing individuals, positively, so that they become useful to themselves and the society.

One of the objectives of Nigerian education is the inculcation of the right values. The National Policy on Education (FRN, 2013), articulated some expectations from schools. Among them are:
   i. Respect for worth and nobility of the person.
  ii. Faith in man's capacity to settle on objective choices.
 iii. Respect for the nobility of work.
  iv. Promotion of enthusiastic, physical and mental wellbeing of all.

The National Policy on Education also indicated that efforts would be made to relate education to the overall needs of the Nigerian society. Values can be seen as the guiding principles that order the life of individuals. They help to shape attitude and beliefs or sentiment on an issue or thing, and are essential for the well-being of the society. Values are the expected modes of behaviour which a society cherishes for her survival. The teacher, therefore, has a significant role to play in transmitting desirable qualities, culture, norms and values to students. Since values give direction, control code of conduct, give sense of right and wrong, and also guide decision making, it is imperative that teacher education should provide the needed value orientation to trainee teachers so as to be able to inculcate the right values into students.

There seems to be a decline in standards of education in Cross River State. A lot of efforts are being made by educators to improve students' achievement through the use of effective teaching methods and approaches that will stimulate students' interest, facilitate learning and enhance achievement. Despite all these, students still perform poorly in the subject. This has created the need for more effective teaching methods that can improve

students' achievement in biology (Okoye, 2014). The percentage distribution of students' achievement in May/June West African Senior School Certificate Examinations (WASSCE) in Biology in Cross River State between 2013 and 2018 is presented in Table 1.

Table 1: Percentage distribution of students' achievement in May/June West African Senior School Certificate Examinations (WASSCE) in Biology in Cross River State, Nigeria, 2013-2018

Years	Total entry	Total statistics	Credit passes (1-6)	% Credit
2013	8,788	8,635	4,595	53.21
2014	7,318	7,126	3,275	45.95
2015	5,849	5,735	2,142	37.34
2016	5,473	5,394	4,260	78.97
2017	5,447	5,377	3,757	69.87
2018	5,407	5,374	3,397	63.21

Source: Statistics section, West African Examination Council (WAEC), Cross River State Office, Calabar, Nigeria

Though a number of factors, such as the use of inappropriate method of teaching, inadequate facilities, class size, poor spelling of technical terms, time factor and shallow knowledge of the subject matter, are responsible for this relatively poor achievement of students in Biology, teachers' inappropriate teaching styles are also fingered as the major problem (Young, 2010). The neglect of activity-oriented method of teaching has led to abstractness in what is taught and these make students less active (passive learners) and more liable to rote memorization. Research findings has advocated the use of self-learning strategies as a way of enhancing students' achievement and promoting their interest in Biology.

Academic achievement has been described as scholastic attainment; while anxiety refers to an excessive or emotional upset characterized by feelings of apprehension, uncertainty or fear in reaction to stressful situations. Salami (2007) defined anxiety as an unpleasant emotion that threatens one's well-being, a feeling of nervousness and worry that may be

manifested in feelings of inadequacy, helplessness, increased heartbeats, and anticipation of punishment. Also, in relation to achievement of students, anxiety suffered by most students comes when they are about to take a test or an examination. This is popularly known as "Examination fever", in the Nigerian society. This anxiety is known as "test anxiety".

Inspiration refers to what exactly stimulates an individual to act with a certain goal in mind. It is a pushing or moving force that causes a person to endeavour to accomplish some objectives regardless of the challenges involved. Adepoju (2008) holds that inspiration assists students to show more ideal demeanour towards school generally and learning specifically. Through inspiration, students' interest is continually utilized. Demeanour infers reliable inclination to respond with a specific goal in mind, regularly positively or negatively, towards a given item, individual, occasion or circumstance. As indicated by Bolaji (2005), an individual's mentality and worth are vital to the learning system as they can make or mar the system, depending on whether they are positively or negatively directed towards a specific goal. They have influences as they can facilitate or restrain conduct in the learning environment. They influence the decision to join in, react, partake and make contributions to learning activities. These dispositions may influence students' academic accomplishment.

More so, according to Bakari and Musa (2013), when guardians are supportive and encouraging, the child creates good opinion about himself; as the child enters school, the endorsement or dissatisfaction by his teachers and friends become significant in the foundation of their self-idea. If a teacher belittles and deprecates a child's endeavours, the child fosters a feeling of inadequacy, which in turn will influence his accomplishment. Age alludes to the time allotment which someone or thing has existed. Gledhill et al. (2002) contributed that in the present time, the arrangement of school is such that students in a school year are placed based on their date of birth.

Brown (2010) reviewed self-concept and academic performance and reported that preparation and consistent work are related regarding self-concept. As indicated by his findings, academic performance is a result of academic demeanour of the student. Subsequently, learning is a result of insight and not self-concept or impression of the student. A positive self-concept is however reported in many aspects of educational research as a significant determinant of results. Self-concept is seen not just as a significant result variable in itself, but additionally assumes a focal part in influencing other advantageous instructive results.

Test anxiety is the mental state of an individual which is influenced by the degree of stress, dread, vulnerability, concern and weakness before, during or after a test or assessment (Olatoye & Afuwape, 2003). The more individuals get restless or stressed over conceivable danger to self, the more troubled and powerless they become. Students' nervousness has been reported as a significant indicator of academic achievement.

As indicated by Oliver (2006), inspiration for assessment can assist with decreasing test anxiety. This should be possible by empowering students and encouraging them to quiet down and do well in the test. It cannot be denied that students' lack of self-confidence might prompt test uneasiness. A study carried out by Cassady and Johnson (2002) on the impact of intellectual test anxiety on students' academic achievement showed that test anxiety has adverse consequence on academic achievement.

Age is a social factor indicating the timeframe during which someone or thing has existed. It is a significant demographical variable that could be useful in clarifying numerous social, emotional and mental elements. Jabor et al. (2011) reported age as a determinant of academic achievement. Ali and Mohsin (2013) found that age essentially affects academic achievement. Abubakar and Oguguo (2011) reported a similar finding when they indicated that age is a critical determinant of academic performance in Biology.

Sequel to the aforementioned, the researchers therefore sought to determine whether students' psychosocial variables are correlates of their achievement in Biology in Calabar Education Zone of Cross River State.

Statement of the problem
The rate of poor achievement of students in biology in public examinations such as NECO, WAEC and JAMB, has been a source of concern to education stakeholders. From the West African Senior School Certificate Examination (WASSCE) Chief Examiners' reports for the years 2015-2019, Fadaozi (2014) specifically noted that the achievements of students in biology are generally poor because the age level, self-concept, test anxiety, attitude toward biology, motivation to study biology are affected in teaching and learning process. Most biology classes are taught using the conventional method of teaching where students simply listen to their teachers and learn from the teaching. This method does not promote in-depth learning. Consequently, students continue to perform poorly in biology because they perceive biology to be abstract and difficult. The problem this study seeks to solve can be stated: what is the relationship between specific psychosocial variables and achievement in biology and to what extent does each of them influence performance of students in biology?

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Research question

1. What interrelationships occur among the following variables: students' self-concept, test anxiety, age, attitudes toward Biology, motivation to study Biology and achievement in Biology?

Hypothesis

Ho1: There is no significant relationship between students' self-concept, test anxiety, age, attitudes towards biology, motivation to study biology and achievement in biology

Methodology

The population of this study was four thousand, five hundred and sixty (4,560) Senior Secondary School Biology students in Calabar Education Zone. The zone is made up of seven (7) Local Government Areas. These are Calabar South, Calabar Municipality, Akpabuyo, Bakassi, Akamkpa, Odukpani and Biase Local Government Areas. This population comprises all senior secondary school students, offering Biology in the seven Local Government Areas that make up the Calabar Education Zone of Cross River State, Nigeria. The sample size for this study was 456 final year senior secondary school students, who were preparing for their Senior Secondary Certificate Examination (SSCE). The design of the study was Correlational design. According to Isangedighi (2012), a correlational design is one in which the researcher seeks to establish the relationship between variables of the study.

The instruments for data collection were Psychosocial Correlate Scale (PCS) and Achievement Test in Biology (ATB). The ATB was a 50 multiple choice item test used to measure achievement in Biology. The PCS was categorized into two sections, labelled A and B. Section A sought to elicit demographic information from the respondents, while section B was further grouped into four parts. Part I was dedicated to measuring self concept, while test anxiety was measured in part II. The attitude of the respondents towards biology was measured using the part III segment of the instrument, while part IV was concerned with measuring motivation to study biology. Each of the four parts had seven items. The response options and scoring include SA (4), A (3), D (2) and SD (1).

Three experts in Educational Measurement and Evaluation in the University of Calabar validated the instrument. To establish reliability, the instrument was administered to 50 randomly selected students who were not part of the study sample. The reliability coefficients, established using Cronbach Alpha statistics, ranged from 0.86 to 0.92. For the ATB, the Kuder Richardson formular 20 (KR-20) was used and the reliability was established as 0.82. The data generated from the study were analyzed and used in testing the hypothesis, using the Pearson Product Moment Correlation.

Presentation of results

Ho1: There are no significant interrelationships between students' self-concept, test anxiety, age, attitudes towards biology, motivation to study biology and achievement in biology.

The independent variables in the hypothesis were students' self-concept, test anxiety, age, attitudes towards biology and motivation to study biology, while the dependent variable was academic achievement in biology. Pearson Product Moment Correlation Analysis was used to test the hypothesis and the results are presented on table 2.

Table 2: Pearson Product Moment Correlation Analysis of interrelationships between students' self-concept, test anxiety, age, attitudes towards biology, motivation to study biology and achievement in biology (N = 456)

Variables	Mean	SD	r-value	p-value
Self-concept	15.506	2.675	.046	.325
Test Anxiety	15.018	3.316	-.149*	.001
Attitude	19.297	4.091	-.005	.923
Motivation	15.448	3.962	-.107*	.022
Age	14.889	1.325	-.016	.727
Achievement	30.129	5.286		

*p< .05, df = 454

The results on table 2 indicate that on self-concept, the calculated r value is .046. This means that there is a small and positive relationship between students' self-concept and achievement in Biology. The positive relationship implies that as students' self-concept increases, their achievement also increases and when it decreases, their achievement also decreases. However, the observed positive relationship is not statistically significant because the p-value is .325 which is greater than .05 significant level at 454 degree of freedom. This means that students' self-concept and achievement in Biology are positively but not significantly related. Hence, this aspect of the null hypothesis is retained.

On test anxiety, the calculated r value is -.149. This means that there is a negative relationship between students' test anxiety and achievement in Biology. The negative correlation implies that as students' test anxiety increases, their achievement in Biology decreases and vice versa. As it is, the observed negative relationship is statistically significant because the p-value is .001 and it is less than .05 alpha at 454 degree of freedom. That means that there is a significant correlation between students' test anxiety

and their achievement in Biology. Therefore, the null hypothesis in respect of test anxiety is rejected.

On attitude towards biology, the calculated r value is -.005, which indicates that the relationship between students' attitude towards biology and their achievement in Biology is very small and negative. The negative relationship implies that students' achievement in Biology decreases as their attitude towards Biology increases and vice versa. Nevertheless, the observed negative relationship is not statistically significant because the p-value which is .923 is higher than .05 alpha level at 454 degree of freedom. Therefore, this aspect of the null hypothesis is not rejected. Thus, there is no significant relationship between students' attitude towards Biology and achievement in Biology.

On motivation to study Biology, the calculated r value is -.107. This means that the relationship between students' motivation to study Biology and their achievement in Biology is negative. It implies that as students' motivation to study Biology increases, their achievement in Biology decreases; and as it decreases, their achievement increases. Howbeit, the observed negative relationship is statistically significant because the p-value is .022, and it is less than .05 alpha at 454 degree of freedom. Thus, students' motivation to study Biology is significantly and negatively related to their achievement in Biology. Therefore, the null hypothesis in respect of motivation to study Biology is rejected.

Lastly on age, the r-cal is -.016, which implies that there is a negative relationship between students' age and their achievement in Biology. The negative relationship means that as students' age increases, achievement decreases; and as it decreases their achievement increases. However, the observed negative relationship is not significant at .05 significance level and 454 degree of freedom. This is because the p-value is .727, and it is greater than .05 alpha level. This means that students' age is negatively but not significantly related to their achievement. Therefore, the null hypothesis, in respect of age, is not rejected but retained.

Discussion of the findings
The results of testing the hypothesis revealed that there is positive but insignificant relationship between students' self-concept and their achievement in Biology; there is a significant negative relationship between students' test anxiety and achievement in Biology; there is negative but insignificant relationship between students' attitude towards Biology and their achievement in Biology; there is negative and significant relationship between students' motivation to study Biology and their achievement in Biology; and there is a negative and insignificant relationship between students' ages and their achievements in Biology. The finding is in agreement with Brown (2010), who conducted

a study on self-concept and academic performance, and reported that preparation and consistent work are related regarding self-concept; and that learning is a result of insight and not self-concept or impression of the student.

This result is equally in line with Olatoye and Afuwape (2003), when they stated that test anxiety is the mental disposition of an individual which is influenced by the degree of stress, dread, vulnerability, concern and weakness before, during or even after a test or assessment. The more individuals get restless or stressed over conceivable danger to self, the more troubled and powerless they become. Students' nervousness has been accounted for as a significant indicator of academic achievement. As indicated by Oliver (2006), inspiration for assessment can assist with decreasing test anxiety. This should be possible by empowering students and offering encouragment that will help to quiet them down to do well in the test. An exploration also carried out by Cassady and Johnson (2002) on the impact of test anxiety on students' academic achievement showed that test anxiety has adverse consequence on academic achievement.

Still in line with the result, Jabor et al. (2011) stated that age is a social factor including the timeframe during which a being or thing has existed. It is a significant demographical variable that could give explanation to numerous social, emotional and mental conditions. Ali et al. (2013) found that age has influence on academic achievement. Jabor et al. (2011) additionally found that age also influences academic performance of students. Likewise, Abubakar and Oguguo (2011) reported that there is a relationship between age and academic performance in Biology.

Conclusion
Based on the findings of this study, it is concluded that self-concept has a positive but insignificant relationship with students' academic achievement in Biology; test anxiety has a negative relationship with students' academic achievement in Biology; there is no significant relationship between students' attitude towards Biology and their achievement in biology; motivation has a negative relationship with students' achievement in Biology; and there is negative but insignificant relationship between students' age and their achievement in Biology. It is also concluded that academic achievement in Biology significantly relates with students' test anxiety and motivation to study Biology while it does not significantly relate with self-concept, attitude towards Biology and the age of the students.

Recommendations

1. Students should be encouraged to concentrate on Biology through supportive statements.

2. The essence of learning Biology should be explained to the understanding of the students to improve on their motivation for studying Biology.

3. Counsellors should be deployed to schools to help the students in managing and reducing test anxiety.

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