Journal of CUDIMAC (J-CUDIMAC)
ISSN 0794-4764 (Print) ISSN 2651-6063 (Online)
Vol. 8. No.1, September, 2020

http://cudimac.unn.edu.ng/volume-8/

Secondary School Students' Self-Concept and Gender as Correlates of Academic Achievement in Biology in Imo State

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Abstract

The purpose of this study was to determine the secondary school students' concepts and gender as correlates of academic achievement in Biology in Imo State. Three research questions guided the study and three null hypotheses were tested at 0.05 level of significance. The design of the study was correlational survey research design. The population of the study consists of all the 2,412 senior secondary two (SS11) biology students in 62 public schools in Orlu education Zone 1 with male students totaling 1,033 and females 1,379. The sample of the study consists of 473 senior secondary two (SS2) biology students (200 males and 273 females) draw from the three selected local government area in Orlu Education Zone 1 of Imo state using multistage sample procedure. The instrument for data collection is titled Personal Self-Concept (PSC) which was developed by Goni, Madariaga, Axpe and Alfredo (2011). Its reliability co-efficient was 0.76. Person's product moment correlation coefficient was used to answer the research questions while multiple regression was used to test the three null hypotheses. The result of the study revealed that there was positive significant relationship between secondary school students' self-concept and academic achievement in biology. The study also revealed that there was a substantial positive relationship among male secondary school students' self-concept and their academic achievement in biology. It also shows that there was a low positive relationship between female secondary school students' self-concepts and academic achievements in biology. Based on these findings, it was recommended among others that biology teachers should discuss positive learning experiences among students so as to boast their self-concepts and also improve their academic achievement especially in biology.

Keywords: Self-concept, academic achievement, secondary education, biology students, gender

Introduction

Secondary education is the education children received after primary education and before the tertiary stage. In Nigeria, the goal of secondary education is to raise generation of people who can think for themselves, respect the views and feelings of others, respect dignity of labour, appreciate those values specified under the broad national goals and live as good citizens (Federal Republic of Nigeria FRN, 2013). Secondary education also inspires students with a desire for self-improvement and achievement of excellence. Secondary education is of six years duration, given in two stages; three years of junior secondary school and three years of senior secondary school. In senior secondary school students are exposed to various science subjects; one of which is biology.

Biology is a branch of science that boosts the development of scientific and technological attitudes in students. It is a branch of science that studies life (Ramalingam, 2011). Biology is a requirement for further learning, training and development for many science-related professional courses such as medicine, pharmacy, botany, zoology, agriculture, biotechnology, biomechanics, conservations biology and ecology (Larkum,2011). Similarly, Neteiyin (2014) and Abubakar (2012) observed that biology as a discipline has contributed tremendously to financial, physical and aesthetic benefits of humanity and to nation building. Biology also helps the individual to understand himself, the environment, appreciate the nature and also control environmental pollution. It exposes man on how to maintain good health through clean water, clean air, good hygiene and sanitation, balanced diet, vaccination against diseases, exercise and adequate rest (Obialor, 2016). Considering the importance of biology to humanity, students are expected to manifest high level of achievement in this school subject both at internal and external examination.

Academic achievement is the amount of knowledge derived from learning (Archana, Chamundeswari & Tammilnadu, 2013). Learning is the process of acquiring new or modifying existing knowledge, behaviours, skills, value or preference (Obialor & Osuafor, 2019). When students are successful in biology examination, they will have the feeling of pride that they made success through their own effort and skills such little success can even give them sense of achievement and accomplishment (Obialor, 2016). However, students' performance in this subject (biology) at external examination had remained persistently poor (Obialor, 2018). For instance, In Sakiyo (2015) work on the assessment of trend of secondary school students' academic performance in Sciences, Mathematics and English, the researcher discovered that Biology had the highest failure rate of 28.66% compared with mathematics 24.39%, chemistry 22.52%, English 21.89% and physics 13.08%. Also report of WAEC 2012-2017, is good evidence.

The poor performance of students in biology has been attributed mainly to poor teaching method adopted by most biology teachers (Nwagbo & Obiekwe, 2009, Okoye, 2014, Okoli, 2006). Thus, Okoli (2006) opined that most science teachers still prefer lecture method of teaching, that is, a teaching method in which the teacher presents a spoken discourse on a particular subject and avoid the use of activity-oriented teaching methods which are student-centered such as inquiring methods, discovering methods and investigative laboratory approach. Obialor (2016) maintained that such teacher-centered approach in which there is a steady flow of information going from the teacher to the students does not enhance achievement in science subjects particularly biology Archana, Chamundeswari and Tammilnadu (2013) also added that factors such as children's attitudes, interest, personality, characteristics and social class in addition to learning affects students' academic

achievement. Therefore, students who attribute success to hard work and effort are likely to obtain high academic achievement; such students seem to have high self-concept. Conversely students who attribute failure to external factors such as luck, teacher's factor may experience failure in future unless they consider themselves capable and address those factors causing failure properly.

Self-concept is a general term used to refer to how someone thinks about, evaluate or perceives oneself. According to Mcleod (2008), one's overall perception, beliefs, judgment and feelings are referred to as a sense of self. Answering questions such as; how do you describe yourself? Are you a good test taker? Are you good at sport? Do you like to be around other? All these tell you something about yourself. It is also seen as the set of perception or reference points that someone has about himself. It is the totality of a complex, organized and dynamic system of learned beliefs, attitudes and opinion that each person holds to be true about his or her personal existence (Huitt, 2011). It is also the student's feelings with regards to their abilities and academic potential (Oludipe, 2002). Oludipe further explains that the learner's feelings about their abilities may impact in their academic achievement. Consequently, academic achievement may not primarily be an expression of learners' abilities but also of their self-concept ability which when positive, helps them to feel confident and able but when negative, cause them to feel hesitant and uncertain. However, gender may be a factor on students' self-concept and achievement in biology.

Gender is described as a socially culturally constructed characteristics and role which are ascribed to males and females in any society (Okeke in Obialor, Osuafor & Nnadi, 2017). Studies carried out by Bakari and Balarabe (2013) on relationship between self-concepts and academic performance of junior secondary school students in Ghana based on gender, found out that there was no significant difference in self-concepts and academic performance of students in Ghanaian junior high secondary schools' subjects on the basis of gender. Riffat, Ghazala and Anjum (2011) in their study of relationship between academic motivation, self-concept and academic achievement in English and Mathematics at secondary school level in Sargodha district reported that there was a significant difference between male and female students in self-concepts and academic achievement in English and mathematics which was in favour of female students. However, most of these studies were carried out in English, Mathematics and junior secondary school subjects and none of these studies was done in Biology. Secondly, it is obvious that the issue of gender differences in students' self-concept and academic achievement has not been resolved and therefore subject for further study. Consequently, this study was carried out to investigate if secondary school male and female students' self-concept relate to their academic achievement in biology in Orlu education zone 1 of Imo State.

Statement of problem

There is a consensus among science educators that biology is an important and useful subject for development in every country. It is a key to technology along with other sciences and mathematics (Amoo & Rahman, 2000; Zakariya, 2004). Considering the importance of biology, students are expected to uphold high academic achievement in both internal and external examinations but the reverse seems to be the case. According to Amakiri and Ukwuije (2016), the poor achievement of students in Biology is reflected yearly in students result published by examination bodies. WAEC 2012-2017, is good evidence. Researchers like Vogel and Collins (2010), Mwaba (2011) Kibet, Mbugua, Muthaa and Nkonke (2012) Osuafor & Okonkwo, (2013) and Obialor (2016) attributed

this poor academic achievement to factors like low funding of education sectors, large class size, insufficient number of qualified teachers, poor teaching, absence of science equipment for practical aspect of biology, motivation, self-attitude and self-esteem among other factors.. This notwithstanding the problem continues to generate several research concerns among stakeholder and science educators.

The deterioration in students' academic achievement as the researchers think may be related to the students not having the right concepts of self. To the knowledge of the researchers not much attention has been given to self-concept in relation to student academic achievement in biology. Besides, the issue of gender differences in students' self-concepts and academic achievement is yet to be conclusive. This study therefore was carried out to investigate the secondary school students' self-concept and gender as correlates of academic achievement in biology in the selected local government area in Orlu education zone of 1 of Imo State using SS2 first, second, third term as well as the annual result of 2015/2016 session.

Purpose of the study

The purpose of this study is to examine the relationship between secondary school students' self-concepts and academic achievement in biology using three selected local government area in Orlu education Zone 1of Imo state. Specifically, the study sought to determine the relationship between:

1. secondary school students' self-concept and academic achievement in biology
2. male secondary school students' self-concept and their academic achievement in biology
3. female secondary school students' self-concept and their academic achievement in biology

Research question

The following questions guided the study

1. What is the type of relationship (positive or negative) between secondary school students' self-concepts and their achievement in biology?
2. What is the relationship between male secondary school students' self-concepts and academic achievement in biology?
3. What is the relationship between female secondary school students' self-concepts and academic achievement in biology?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance

HO_1: There is no significant relationship between secondary school students' self-concepts and their academic achievement in biology

HO_2: There is no significant relationship between male secondary school students' self-concepts and their academic achievement in biology

HO_3: There is no significant relationship between female secondary school students' self-concepts and their academic achievement in biology

Theoretical framework

The theory that gives meaning to this study is Carl Roger's Humanistic Theory of Personality Development. Humanistic Theory was propounded by Carl Rogers in 1949. Rogers based his theories on personality development on humanistic psychology and theories of subjective experience. Carl Roger's Humanistic Theory state that everyone exists in a constantly changing world of experience, that one is at the centre of. A person reacts to changes in their phenomenal fields; the phenomenal field refers to a person's subjective reality, which includes external objects and people as well as internal thought and emotions. The person's motivation and environment both act on their phenomenal field.

Rogers believed that all behaviour is motivated by self-actualized tendencies, which drive a person to achieve at their highest level. As a result of their interactions with the environment and others, an individual form a structure of the self or self- concept–an organized, fluid, conceptual pattern of concepts and values related to the self. If a person has a positive self-concept, they tend to feel good about who they are and often see the world as a safe and positive place. If they have a negative self-concept, they may feel unhappy with whom they are.

Rogers further divided the self into two categories: The ideal self and the real self. The ideal self is the person you would like to be; the real self is the person you are actually. Rogers focused on the idea we need to achieve consistency between these two selves we experience congruence when our thoughts about our real self and ideal self are very similar, in other word, when our self-concept is accurate, high congruence leads to a greater sense of self-worth and a healthy, productive life. Conversely when there is a great discrepancy between our ideal and actual selves, we experience a state Rogers called incongruence, which can lead to maladjustment.

The theory has some implication to this study in that, when an individual is loved, cared for and feel protected; his self-concept will be boosted hence aligned perfectly with reality (congruence), which will consequently lead to positive relationship in his academic achievement. Again, since positive self-concept make individual to feel good about whom they are and observe the world as a safe place. The individual will trust his/her own perception of judgment, clearly differentiate right from wrong, act constructively and choose behavior that is appropriate for each moment, this in turn will have positive relationship to their achievement. The reverse may be the case if individual has negative self-concept and experience incongruence in his daily life and needs.

Method

Research Design

The research design adopted for this study is Correlational Survey. According to Akuezuilo and Agu (2007), a corelational study seeks to establish relationship between two or more variables. Therefore, the researchers employed this design because this study seeks to establish the relationship that exist between three variables; self-concept, gender and academic achievements of secondary school students in biology.

Population for the Study

The population of the study consists of all the SSII biology students in the 62 public schools in Orlu education Zone of Imo State. The population size is 2,412 students made up of 1033 male and females 1,379 students enrolled for 2015/2016 academic session.

Sample and Sampling Techniques

The sample of the study was made up of 473 senior secondary two (SS11) biology students which consists of 200 males and 273 females drawn from the three (3) selected Local Government Area in Orlu Education zone 1 of Imo State. Multistage sampling was employed. First purposive sampling was applied to select three out of eight LGAs in Orlu education Zone 1. The three Local Government Areas selected were Orlu, Orsu and Ideato North LGA and they have total number of 32 schools. Proportionate Stratified Random sampling was used to select 12 out of the 32. Four hundred and seventy-three (473) SSII biology students were selected from the 12 schools using proportionate random sampling. This technique was also employed in selecting the number of males and females used from each school.

Instruments of Data collection

The instrument used for data collection was Personal Self-concept (PSC) Questionnaire. The PSC is an 18-item inventory developed by Goni, Madariaga, Axpe and Alfredo (2011). The questionnaire is a Likert scale with five responses options ranging from totally disagrees to totally agree. The academic achievement of students in Biology was generated from their First, second and third term as well as the annual result of 2015/2016 session.

Validation of the Instrument

The instrument Personal Self-concept Questionnaire is a standardized instrument. The instrument is already validated therefore need no further validation, since the instrument was adopted.

Reliability of the Instrument

Cronbach's alpha was used to establish the reliability of the instrument and internal consistency yielded 0.60 to 0.90.

Method of Data Analysis

Pearson's Product Moment Correlation Coefficient was used to answer the research questions. Pearson's product moment correlation is ideal for ascertaining the extent of relationship between two or more variables (Nworgu, 2015). For the research questions the coefficient (r) and the size of the relationship was interpreted using the interpretation of a correlation coefficient by Dowine and Heath in Nworgu (2015) as follows:

Coefficient (r)	Relationship
0.08 and Above	High
Above 0.30- Below 0.80	Moderate
0.30 and below	Low

To determine the significance of the relationship in all the null hypotheses, the calculated *p-value* was compared with the stipulate level of significance (0.05). Where the calculated *p-value* is less than the stipulated level of significance (0.05), the null hypothesis was rejected. Whereas the null hypothesis was not rejected where the calculated p-value is greater than the stipulated level of significance (0.05).

Result

Research Question 1: What type of relationship exists between Secondary school students' self-concept and academic achievement in Biology?

Table 1: Pearson's Correlation between Self-Concept and Biology Achievement

Variables	N	Self-Concept	Biology achievement	Remark
Self-concept	473	.1	.46	
Biology achievement	473	.46	1	Moderate Positive Relationship

As shown in Table 1, the Pearson's Correlation Coefficient, r. = .46. This shows that there is a moderate positive relationship between secondary school students' self-concept and academic achievement in biology.

Research Question 2: What is the relationship between male secondary school students' self - concept and their academic achievement biology?

Research Question 3: What is the relationship between female secondary school students' self-concept and their academic achievement biology?

Analysis of data for research questions 2 and 3 are shown in Table 2

Table 2: Pearson's Correlation between Male Sec. Sch. Student Self-Concept and Academic Achievement in Biology and Female Sec Sch. Students' Self-concept and Academic Achievement in Biology

		N	Self-concept	Biology achievement	Decision
	Self-concept	200	1	67	
Males	Biology achievement	200	.67	1	Moderate positive Relationship
Females	Self-concept	273	1	34	
	Biology achievement	273	.34	1	Moderate positive Relationship

As shown in Table 2, there is a moderate positive relationship between self-concept and biology achievement for males. This is shown by the size of the Pearson's Correlation Coefficient r, which is .67. On the other hand, a moderate positive relationship exists between self-concept and biology achievement for females as shown by the size of the Pearson's Correlation Coefficient r, which is .34. Based on sizes of the effects of the relationships, .67 for males and .34 for females, the male showed higher positive relationship than the females.

Hypothesis 1: There is no significant relationship between secondary school students' self-concept and academic achievement in Biology?

Table 3: Test of Significance Relationship Between Self-Concept and Academic Achievement in Biology.

Variables	N		B	Beta	df	t	p-value	*Remark*
			.					
Self-concept	473	.46	377	.222	471	4.69	0.00	Significant

Data analysis in table 3 shows that 22% of self-concept contributed to the students' academic achievement in Biology. t calculated is 4.686. r (473) = .46, $p < 0.05$. Since self-concept contributed 22% of achievement and p- value was less than the stipulated level of significance, the null hypothesis is rejected. Therefore, there was significant relationship between secondary school students' self-concept and academic achievement in Biology.

Hypothesis 2: There is no significant relationship between male secondary school students' self-concept and academic achievement in biology

Hypothesis 3: There is no significant relationship between female secondary school students' self-concept and academic achievement in biology.

Test of hypotheses 2 and 3 are shown in Table 4

Table 4: Test of Significance of Pearson's Correlation between Male Sec. Sch. Students' Self-Concept and Academic Achievement in Biology and between Female Sec. Sch. Students' Self-concept and Academic Achievement in Biology.

		N	Self-efficacy	Biology achievement	Remark
	Self-concept	**200**	**1**	**.67**	
Males				.00	**significant**
	Biology achievement	**200**	**.67**	**1**	
	self-efficacy	**273**	**1**	**.34**	
Females				**.00**	**significant**
	Biology achievement	**273**	**.3**	**1**	

As shown in table 4, there is a significant relationship between self-concept and biology achievement for males. r, (200) =.67 and *P*-value <0.05. Significant relationship also exists between self-concept and biology achievement for females. r, (273) =.34, *P*-value >0.05.

Summary of the findings

The findings of the study are summarized as follows:

1. There is moderate positive relationship between secondary school students' self-concept and academic achievement in Biology.
2. There is moderate positive relationship between male secondary school students' self-concept and academic achievement in Biology.
3. There is moderate positive relationship between female secondary school students' self-concept and academic achievement in Biology.

Discussion

The result of the study revealed moderate positive relationship between secondary school student' self-concept and academic achievement in Biology. Also, there is significant positive relationship between the students' self-concept and academic achievement in Biology. This means that the students that have positive self-concept achieve higher in Biology and those with negative self-concept. This is in line with the opinion of Kristy, Ian, Marjoire and Rhoda (2011) that a positive self-concept is important for good mental health and improved academic achievement. This finding is also in line with the opinion of Bakari and Balarbe (2013) that there is positive relationship between self-concept and academic achievement in Junior High School Students in Ghana. Bakari and Balarabe (2013) also stated that students with high academic self-concept may remain focused and out - perform their colleagues academically.

The findings revealed that there is moderate positive relationship between male secondary school students' self-concept and academic achievement in Biology and female possess low self-concept and there is moderate positive relationship between self-concept and their academic achievement. This means that male and female students with positive self-concept achieve higher than the male and female students with negative self-concept. Also, the low self-concept possess by the female students may contribute to their poor achievement in biology. This agrees with the view of Bakari and Balarabe (2013) that students who perceive themselves as academically competent obtained higher grades because their self-concept led them to be more autonomously motivated at school. In contrast, students with negative self-concept about their academic ability have low aspiration and in turn perform poorly (Bandura in Willians and Willians, 2010).

Conclusion

From the discussion above, results show that there is a significant relationship between students' self-concept and academic achievement in biology. There is also significant relationship between students' self-concept and their academic achievement in biology based on gender. The researchers therefore conclude that students' self-concept can be a contributing factor towards male and female students' academic achievement in biology.

Recommendations

Based on the findings of the study the researchers recommend the following;

1. Biology teachers should discuss positive learning experiences among the students so as to boast their Self-concept and also improve their academic achievement especially in biology.
2. Biology teachers should employ classroom instructional activities that can enhance male and female students' self-concepts so as to boost their academic achievement in biology.

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