RELATIONSHIP BETWEEN SECONDARY SCHOOL STUDENTS' SELF-CONCEPT AND ACADEMIC ACHIEVEMENT IN BIOLOGY IN PLATEAU STATE CENTRAL SENATORIAL ZONE, NIGERIA

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Abstract
The study investigated the relationship between secondary school students' self-concept and academic achievement in Biology in Plateau State Central Senatorial Zone, Nigeria. A correlational research design was used for the study. Three hypotheses were formulated. The population of the study was all the 5,460 senior secondary two students in the zone. The sample size used was 300 students. Purposive sampling technique was employed to draw the representative sample for the study. Data was collected using the Self-Concept Conduct Inventory (SCCI) and School Academic Record of students in senior secondary two Biology examination for the three terms in an academic session. The instrument was validated by three Science Education experts in the Department of Science and Technology Education, University of Jos. The reliability of the SCCI was determined using Cronbach's alpha formula and it yielded an internal consistency coefficient of 0.76. The Person Product Moment Correlation statistic (PPMC) was used to determine the relationship between self-concept and students' academic achievement and the t-test for independent samples was also used to determine whether any difference exist between students' self-concept and between their academic achievement based on gender. The result showed that there is a strong positive relationship between secondary school students' self-concept and academic achievement in Biology, also, there is no significant difference between self-concept and academic achievement based on gender. The study therefore recommended that necessary measures be put in place in our educational system to remove inferiority complex in our students and also enhance the development of positive self-concept of students.

Keywords: Academic achievement, Biology, Gender, Self-concept

Introduction
In contemporary Nigeria, greater emphasis is placed on science and technological development, and students are required to take up science subjects in their senior secondary classes. One common subjects that students usually opt for is biology (Ugwu & Nzewi, 2015). Biology is both fascinating and fun to study at the secondary levels, especially when connected to everyday life. The subject Biology piques intellectual curiosity, increases awareness of fragile ecosystem and stimulates critical thinking (Martens, 2018). The teaching of Biology in senior secondary schools aimed at increasing understanding of living systems and allows the opportunity to compare the systems in relationship to the self and other organisms in the natural environment. Biology is one of the science subjects offered at the senior secondary school levels in Nigerian secondary schools (FRN, 2004). It is a very important science subject and a requirement for higher learning in a number of science-related professional courses like medicine, agriculture, pharmacy. However, students' performance is unsatisfactory and several factors are responsible for underachievement in Biology to include poor teaching method, self-concept among others.

Self-concept is defined as what an individual view himself to be (Sartain & Hewitt, 2002). It is a person' derived meaning of himself in some roles, situations or positions. Sartain and Hewitt continued that Self-concept consists of all the ideas; perceptions one develops about oneself on the basis of what that individual perceives of himself. Al-Zyoudi (2007) defined self-concept as the value that an individual place on his or her own characteristics, qualities, abilities and actions. Furthermore, Gwaison (2010) sees self-concept as an organized and consistent way an individual think, feels, and reacts to issues concerning him or herself. That is, the way a person sees himself arising from his personal experiences. Thus, it is a set of feelings and cognition about oneself. That is, it is perceived as one's attitude towards himself or herself. There is a growing awareness that of all the perceptions we hold in the course of life, none has more profound significance than the perception we hold regarding our own existence, our concept of whom we are and how we fit into the world (Gwaison, 2010).

Self-concept is an area that is very important to educationists and occupies a central place in personality development of students. A student's academic, social and emotional adjustment at school is dependent on his or her perception of self (Gwaison, 2010). For example, if a student feels that he is worth much, he prepares his mind to cope with social, emotional and academic demands of the school. If on the other hand, he pictures himself as a failure, the opposite is manifested. It is clear that self-concept is a central construct which develops through interactions with others. It is technically conceived that it is the locus of the experience that represents the total being whose physical, psychological and spiritual dimensions cannot be separated except artificially. Laryea, Saani and Dawson-Brew (2014) found that one of the most significant factors responsible for students' academic performance is their self-concept. They maintained that if students are expected to perform well in their examinations, positive self-concept is sine qua non. It seems therefore, there may be a correlation between self-concept and academic achievement of students.

Academic achievement is an important indicator of adjustment or learning. It is an important variable in school system as it provides the yardstick for measuring academic progress. Umar, Manklibet and Dung (2019) viewed academic achievement as outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in schools, colleges, universities. In the same vein, Covay and Carbonaro (2010) opined that academic achievement is the extent to which a student has achieved their education goals, example, Cumulative Grade Point Average (CGPA) and completion of educational degrees such as High school and Bachelor's degrees and so on. Self-concept is seen as one of the numerous factors that influence performance. Boulter in Afolabi (2019) posited that one of the most significant factors responsible for students' academic performance is their self-concept. Laryea, et al. (2014) established that the self-concept of students influences their academic performance in schools indirectly through students' effort in learning. They argued that if students are to perform well in their examinations, positive self-concept is key. Dulay (2017) asserted that academic self-concept plays a central role in the academic achievement and adaptation of the students. He revealed a positive relationship between self-concept and students' achievement. Similarly, Jaiswal and Choudhuri (2017) and Kaur (2018) found a significant positive correlation between self-concept and academic achievement.

The concept of gender is defined as an understanding of the socially constructed distinction between male and female, based on biological composition, including the roles and expectations for males and females in a culture (APA Dictionary, 2015). Joseph, John, Eric, Sada and

Olubunmi (2015) defined gender as the range of physical, biological, mental and behavioural characteristics pertaining to and differentiating between the feminine and masculine population. They further asserted that gender is one of the factors that have considerable effects on students' academic achievement especially in science subjects. In many tribes and communities in Nigeria, there seems to be gender based bias in the pattern of children training. Parents assign tasks regarded as complex and difficult to boys whereas girls are expected to handle the relatively easy and less demanding tasks (Joseph, et al., 2015). They maintained that as a result of this way of thinking, the society tends to see females as weaker gender. Consequently, an average Nigerian girl-child goes to school with this stereotyped mentality. According to Achor, Wude, and Duguryil (2013), gender stereotypes seem to be a major impediment to achievement. Similarly, Temitope (2011) posited that due to African culture and traditions, males are more inclined towards the sciences while females tend to tilt more to the arts.

Studies have revealed significant gender gaps in self-concept and academic achievement of secondary school students. The academic achievement of male and female students in science, technology and mathematics has been perceived differently by researchers. Omwirhiren (2013) and Daluba (2013) noted that the male performed significantly better than their female counterparts in science concepts. In the same vein, Al-Zyoudi (2007), Bleidorn (2016), and Muthuri and Arasa (2017) in their separate studies revealed that the male students scored higher than female students on the self-concept scale. Furthermore, Zhang (in Muthuri & Arasa, 2017) also reported that males are more satisfied with themselves than females. Other researchers such as (Aiken, 2007; Emaiku, 2012; Joseph, et al., 2015) have also reported gender differences in academic achievement among students in Science based on gender with the male students scoring higher than the females. Mohammad (2014), Voyer and Voyer (2014) found that female students have a little but significant advantage in science achievement. On the other hand, Ajai and Imoko (2015), Nbina and Avwiri (2014), Joseph, et al. (2015) revealed that there is no significant difference in achievement scores of male and female students.

It is a general desire and aspiration of students, parents, educators and all stakeholders of education, that students in all levels of education, excel in their pursuance of academic work at all times. In view of this, various attempts are being made by students, parents, teachers among others in Nigeria to ensure high academic performance among students. Some of these attempts include the act of organising extra classes for students by teachers during the term, summer classes during long vacation and parents spending extra monies on their children's education, and government insistence that all teachers in Nigeria must possess the requisite teaching qualification and must pass the certification examination usually organized by the Teachers Registration Council of Nigeria (TRCN).

In spite of these efforts, it appears the performance of students in science in general and Biology in particular at the senior secondary certificate examination remains unimpressive. Ugwu and Nzewi (2015) observed that one common Science subjects that secondary school students usually opt for is Biology, yet achievement has not been very encouraging. Gwaison (2010) noted that students' performance in Biology in most public examinations (NECO, WASSCE, UTME among others) over the years is low. In the same vein, Ewona and Etuk (2008) observed poor academic achievement especially in subjects such as English, Mathematics and Science (Biology inclusive) in the Senior Secondary School Certificate Examination (S.S.C.E). This position buttressed by WAEC SSCE Chief Examiner's report on Biology for 2015, 2016 and 2018 showed that the overall performance of students in biology is poor. The report further revealed that school candidates' weaknesses that resulted to poor

performance include poor drawing of diagrams, poor attempt in answering questions that require detailed explanations, wrong spelling of biological names and terms, inability to use technical terms to describe some processes, in ability to compare biological processes appropriately. However, psychological constructs like self-concept have not been taken into consideration by the WAEC examiners. The students' poor performance in Biology has drawn the attention of researchers and curriculum planners towards Biology as a subject in the school curriculum (Mwaba, 2011). The desire to know the causes of poor performance in Biology has been the focus of researchers for some time now. Usman (2015) showed that in spite of the huge resources parents, the government and other stakeholders are investing in educating the learners, there is no commensurate performance to match the vast investment. Usman maintained that students' performance in senior school certificate examination (SSCE) has been abysmal. Perhaps, the issue of great concern is the student's self-concept appears students' low academic performance could be linked to poor Self-concept. In the light of this, Laryea, et al. (2014) posited that one of the most significant factors responsible for students' academic performance is their self-concept. In furtherance to that, Aryana (2010) opined that self-concept of students plays an important role in determining their academic achievement. Considering the continuous decline in the achievement of secondary school students in career determining examinations such as SSCE, it becomes pertinent to examine the relationship between students' self-concept and academic achievement. Hence, the choice of the topic of this study is worth the while. Therefore, this study seeks to investigate secondary school students' self-concept and academic achievement in Biology in Plateau Central Senatorial Zone of Plateau State.

Purpose of the Study

The main purpose of the study is to investigate the relationship between secondary school students' self-concept and their academic achievement in Biology in Plateau State Central Senatorial Zone. In addition, the study also sought to determine whether any differences exist in secondary school students' self-concept and academic achievement based on gender.

Hypotheses

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

Ho1: There is no significant relationship between self-concept and academic achievement of secondary school students in Biology.

Ho2: There is no significant difference between male and female senior secondary school students' in their self-concept.

Ho3: There is no significant difference between male and female senior secondary school students' in their academic achievement in Biology.

Methodology

The correlational research design was used for this study. This design was employed because two sets of continuous data were collected from the same respondents to determine relationship. This is in agreement with Awotunde and Ugodulunwa (2004) who put forward that in correlational design, data are collected from the same group or units on two or more variables and correlation coefficient computed to determine the relationship between them.

The population of the study comprised all the 5,460 senior secondary two (SS2) students in Plateau State Central Senatorial Zone which is made up of five Local Government Areas: Bokkos, Mangu, Pankshin, Kanke and Kanam. Three LGAs; Bokkos, Mangu and Pankshin, were randomly selected for the study. Two schools each were purposively selected from the three LGAs under consideration to include a public and a private secondary school each, giving a total of six schools from which the study sample was drawn. The male and female students of senior secondary two who offer Biology from each of the selected schools were grouped into A and B according to their gender and 25 students were randomly selected from each group. A sample of 50 students comprising 25 males and 25 females were selected to have equal number of respondents from each of the schools selected. This gave a total of 300 respondents.

Table 1: The sample distribution of respondents

LGAs Selected	Schools Selected	Sample Size
Bokkos	All Nations Academy Bokkos	50
	GSS Mbar Bokkos	50
Mangu	Dastu Comprehensive Academy Pushit	50
	GSS Bwalbwang Gindiri	50
Pankshin	Trinity Missionary School Pankshin	50
	GSS Bet- Pankshin	50
Total		300

Data Collection

Data used in this study was collected using the Self-Concept Conduct Inventory (SCCI) and School Academic Record of students in SS2 Biology examination for one academic session. The academic record used was the annual summary average score of the respondents in Biology for three terms in percentage (%), extracted from their school dossiers. Only the academic records of those students who filled the SCCI were used. The Self-Concept Conduct Inventory (a self-description questionnaire) originally developed by Akinboye (1986) was adapted for this study. The researchers used the SCCI because it facilitated gathering of information on belief, feelings, perceptions, characteristics, abilities and behaviours of the respondents. It has 30 items with a four-point Likert scale with responses of Strongly Agree (4), Agree (3) Disagree (2) and Strongly Disagree (1). A highest possible score of 120 could be obtained. The instrument required respondents to tick any of the responses that best described them. Each respondent's total score was converted to percentage (%). The instrument (SCCI) was validated by 3 Science Education experts in the Department of Science and Technology Education University of Jos and was administered to 30 senior secondary two students of ECWA Secondary School Kabong in Jos North Local Government Area which was outside the study area but possesses similar characteristics with the intended population for pilot-testing. It yielded an internal consistency coefficient of 0.76 using Cronbach's alpha formula.

The data collected were subjected to statistical analyses using inferential statistic such as the Pearson Product Moment Correlation and t-test for independent samples. The PPMC was used to correlate students' self-concept with their academic achievement. While, the t-test for independent samples was used to determine whether differences exist between students' self-concept and academic achievement based on gender in the selected areas at 0.05 alpha level. The analysis was done on SPSS version 23. The correlation coefficient is classified as follows;

0.1-0.4 = weak positive correlation, 0.5-0.7= strong positive correlation, 0.8-1.0 = very strong to perfect positive correlation.

Results

Ho1: There is no significant relationship between self-concept and academic achievement of secondary school students in Biology.

Table 2: Person Product Moment Correlation of Relationship between Students' Self-Concept and Academic Achievement in Biology

Variable	Mean	SD	N	R	A	p-value	Decision
Self-concept scores	54.35	10.47	300	0.67	0.05	.000	Significant
Academic achievement scores	54.76	11.47	300				

Table 3 revealed that r = 0.67, p-value = 0.000, which means p< 0.05. Since the probability value is smaller than 0.05, we reject the null hypothesis and accept the alternate hypothesis. Hence the null hypothesis which says there is no significant relationship between secondary school students' self-concept and academic achievement in Biology is rejected because there is no sufficient evidence to accept the null hypothesis. The correlation coefficient (r) of 0.67 further shows that there is a strong positive relationship between students' self-concept and academic achievement. This implies that as students' overall self-concept increases, their academic achievement also increases and vice versa.

Ho2: There is no significant difference between male and female senior secondary school students' in their self-concept.

Table 3: T-test of Difference between Male and Female Senior Secondary School Students' in their Self-Concept

Variable	N	Mean	SD	M. dif	Df	t	A	p-value	Remark
Male Self-conc. Score	150	53.68	11.02	-1.46	298	-1.21	0.05	.228	Insignificant
Female Self-conc. Score	150	55.14	9.87						

Table 3 revealed a t-value of -1.21, while the probability value (p=value) is 0.228. This means p>0.05. The null hypothesis which says that there is no significant difference between male and female senior secondary school students' in their self-concept is therefore retained. This indicates that no significant difference exists between secondary school students' self-concept based on gender. The male self-concept mean score of 53.68 is slightly less than the female students' self-concept mean score of 55.14, but the difference in the mean scores is not significant at 0.05 level of significance. This implies that the students have similar self-concept.

Ho3: There is no significant difference between male and female senior secondary school students' in their academic achievements in Biology.

Table 4: T-test of Difference between Male and Female Senior Secondary School Students' in their Academic Achievements in Biology

Variable	N	Mean	SD	M. dif	df	t	α	p-value	Remark
Male Students' Achievement Score	150	53.99	11.62	-1.79	298	-1.31	0.05	.546	Insignificant
Female Students' Achievement Score	150	55.77	12.07						

Table 4 reveals that t = -1.31, p-value = .546, which means p>0.05. Since the probability value is bigger than the alpha level, the null hypothesis which says that there is no significant difference between male and female senior secondary school students in their academic achievement in Biology is accepted because there is no sufficient evidence to reject the null hypothesis. The male students' academic achievement mean score of 53.99 is slightly less than the female students' academic achievement score of 55.77, but the slight difference in mean scores is not significant at 0.05 level of significance. This implies that the achievements of both male and female senior secondary school students are similar. Hence, they are capable of competing in Biology.

Discussion of Findings

The first hypothesis of the study revealed that a significant positive relationship exists between secondary school students' self-concept and academic achievement in Biology. This implies that as students' overall self-concept increases, their academic achievement also increases and vice versa. The result confirms the finding of Hamack (2010). He found out that there is a relationship between self-concept and academic achievement. Laryea, et al., (2014) also concluded that one of the most significant factors responsible for students' academic performance is their self-concept. They maintained that if students are expected to perform well in their examinations, positive self-concept is sine qua non. This implies that a child achieves as high as his self-concept and as low as his self-concept. Therefore, individual students' self-concept determines to a large extent his or her performance in a given task. However, the finding of Mbakwe (2006) contradicts the result of this study. He submitted that students' academic success is largely a function of the amount of effort put into study. The findings from this study thus provides an empirical evidence for proposition that self-concept enhancement is a strong factor for educational achievement.

The second hypothesis which states that there is no significant difference between male and female senior secondary school students' in their self-concept was retained. The result of the study therefore revealed that no significant difference exists between male and female senior secondary school students' self-concept. A small mean difference of -1.46 that exists between the male and female self-concepts is not significant at 0.05 level of significance. This implies that the male and female students do not differ significantly in their self-concept rating. This result contradicts the findings of Al-Zyoudi (2007), Bleidorn (2016) and Muthuri and Arasa (2017). Their separate studies revealed that the male students scored higher than female students on the self-concept scale. In the same vein, Zhang (in Muthuri & Arasa, 2017) showed that males are more satisfied with themselves than females. The researchers believe that the insignificant difference observed could be due to the renewed effort of both the Federal Government of Nigeria and Non-Governmental Organizations in creating awareness in the general public on the equality of the girl-child to the boy-child. These awareness campaigns might have started yielding positive results such that the female folk are realizing that they are

worth it after all, hence thinking positively about themselves resulting in high self-concept. The 35% affirmative action of the Federal Government of Nigeria could also be one of the factors that are motivating the female folk in the country to have confidence in their abilities, competences, characteristics and behaviours.

The third hypothesis of the study which states that there is no significant difference between male and female senior secondary school students in their academic achievement in Biology was retained. This revealed that no significant difference exists between male and female senior secondary school students' academic achievement in Biology. This implies that the secondary school students do not differ in their academic achievement in Biology according to gender hence are capable of competing in Biology. This result supports Nbina and Avwiri (2014), Ajai and Imoko (2015) who reported that male and female students do not differ significantly in achievement scores. Joseph, et al. (2015) also concluded that there is no significant difference in students' academic achievement in computer based on gender. However, Emaiku (2012) and Aiken (2007) contradicted the findings of the above scholars when they asserted that male students are often superior to female students in academic achievement in schools. Omwirhiren (2013) and Daluba (2013) also noted that the male performed significantly better than their female counterparts in science concepts. In the same vein, Mohammad (2014), Voyer and Voyer (2014) found that female students have a little but significant advantage in science achievement. This implies that the female students are capable of pursuing their interest in Biology just as their male counterparts. The researchers believe that the hard reality of life has made the female folk to realise the need to pursue western education vigorously for better job opportunities. The female students' support initiative by the Carnegie Foundation in Nigeria could also be a strong motivation for high performance by female students.

Conclusion

This research showed that self-concept is an important variable in academic achievement. It is a very essential element in an individual's personality. Seen as the value an individual place on his or her own characteristics, qualities, abilities and action, self is then a reference point in all interactions.

Based upon the findings of this study, the researchers concluded that secondary school students' self-concept has a significant positive relationship with their academic achievement in Biology. This clearly depicts that students' academic achievement is to a large extent related to their self-concept and this calls for a renewed effort on the part of all stakeholders in the education sector to help students develop their overall self-concept early in life. The study also concluded that senior secondary school students do not differ significantly in their self-concept based on gender. It further concluded that secondary school students do not differ significantly in their academic achievement based on gender.

Recommendations

The study recommended that necessary measures be put in place in our educational system by government, school administrators and all stakeholders to remove inferiority complex in our students early in life and also enhance the development of positive self-concept of students. Similarly, government, school administrators and all stakeholders should also promote programmes and actions that seek to engender the building of self-worth among students. It further recommended that parents and guardians should; expose children to atmosphere of love and acceptance, praise children's efforts and accomplishment and refrain from negative

comments and feedbacks earlier in life. This will go a long way to foster the development of high self-worth, hence positive self-concept.

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