SELF-CONCEPT AS CORRELATES OF BIOLOGY PERFORMANCE AMONG SECONDARY SCHOOL STUDENTS IN MINNA NIGER STATE, NIGERIA

BY

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JANUARY, 2023

ABSTRACT

The study investigated self-concept as correlates of Biology performance among secondary school students in Minna, Niger state. The purpose was to determine the relationship self-concept and students Biology performance in Minna, metropolis of Niger state. The researcher adopted a correlational research design. The population of the study was made up of 17,998 SSII biology students across Bosso and Chanchaga local government area of Niger state. 375 male and female Biology students were randomly selected from 12 selected secondary schools on a proportion basis. Six (6) research questions and five (5) null hypotheses were formulated and guided the study. Questionnaire on Self-Concept (QSC) comprised of Academic Self-Concept (ASC), Social self-concept (SSC) and Physical Self-Concept (PSC) was used for data collection. The instruments were pilot tested using Cronbach Alpha and yielded a reliability coefficient of 0.72, 0.71 and 0.82 respectively for ASC, SSC and PSC. Mean, Standard Deviation and scatter plot was used to answer the research questions, while linear regression was used to test the null hypotheses. The findings shows that Biology students in Minna have high perception about self-concept; that there was a relationship between respondents' academic self-concept and Biology performance. Based on these findings, it was recommended among others that Biology teachers should use teaching method like discussion, grouping, interaction among students to help boost their social self-concept; Biology teachers in collaboration with school administrators could design various mechanism like games, sport, positive self-talk to improve physical, social and academic self-concept of students towards Biology performance.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

1.0

Science Education is the bedrock of development of any nation. No nation can develop significantly without effective and meaningful teaching and learning of science education. The critical role of science education to the development of every nation cannot be over emphasized. This is because it has positively influenced every aspect of human life and national development, (socially, economically politically and technologically). In the 21st-century there is need for a workforce with science content knowledge and skills to innovate, invent and solve problems. The key to producing present and future workforce with these required skills is improving the quality of science education among others. Science education is an integral part of the education system of any country due to its significance and contribution to man and the society. Every country would find it difficult to develop technologically and economically without meaningful learning of science of its citizen.

It is probably in recognition of the role of science education that every nation pays a great emphasis to effective science teaching and learning. In support of this assertion, the National Policy on Education in Nigeria stipulates that science is to be taught as a core subject to all the students at the primary and secondary education level in order to give them a sound basis for scientific acquisition of science process skills, reflective thinking and prepare them for the next level of education (Federal Republic of Nigeria, FRN 2004). Government policies of 60:40 admission ratio between science and technology related courses and arts in higher institution is a testament on the importance of science and technology education in the 21st century.

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Apart from the vital role of science education in general, developments in Biology such as Genetic cloning, kidney transplant, production of test-tube babies, genetic counseling, disease, and bioengineering to produce high yielding varieties and disease resistant species are possible. These have made Biology to be one of the most useful branches of science because it has helped in various ways to improve the lots of humanity (Akande et al., 2018). Moreover, the study of Biology in senior secondary schools is expected or meant to prepare the students so as to acquire adequate laboratory and field skills in Biology; meaningful and relevant knowledge in Biology; ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture; reasonable and functional scientific attitude (Ihekwoaba, 2019). Nevertheless, it could be affirmed that most students have not fully attained the above stated objectives as a result of their poor academic achievement in both external and internal Biology examinations. Based on the external examinations of Biology students, the Chief West African Examination Council (WAEC) examiners report specifically 2016/2017 and 2018/2019 showed the dwindling academic achievement of Biology students but 2021 reports students performance was better.

Despite the positive roles played by science education in general and Biology specifically, the teaching and learning of Biology in particular has been unsatisfactory. Research has shown that students' performance in Biology at the secondary school level is not encouraging (Ramon *et al.*, 2019; Gimba *et al.*, 2018). Several factors reported to be the causes of the poor performance include; poor teaching method, lack of instructional materials, and lack of qualify teachers among others. WAEC (2021) reported better performance compared to previous years poor academic performance of students in science subjects particularly in Biology from 2007-2011 as reported by the chief examiners' report. WAEC (2017) revealed poor academic performance of students

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in science subjects particularly in Biology from 2007-2011 as reported by the chief examiners' report.



Figure 1.1: WAEC (2017) The Chief Examiners Report

Meaning that students' performance in Biology is annually declining and so, need urgent attention to find the possible causes of the situation. In view of this, literature is replete on instructional approaches and the use of technological platforms to address the issues, but poor performance has persisted.

S/N	Year	Total Number of Candidate	Mean	Standard Deviation
1	2014	1,415,341	29.00	12.37
2	2015	1,182,038	25.00	11.87
3	20016	1,087,921	31.00	10.91
4	2017	Above 1million	31.00	11.92
5	2018	1,087,884	30.00	9.00

 Table 1.1: Students' Performance in Biology Examinations conducted by WAEC

 from 2014-2018 in Nigeria.

Source: Onanuga et al. (2020); WAEC Chief Examiner's Reports (2018)

Table 1.1 is a record of mean performance of students in Biology for period of five years, which reveals that the mean is fluctuating between 25.00 and 31.00. The first statistical figure reveals declining performance between 2007-11. In fact, there was a

sharp decline in the students' mean performance in 2015 with mean performance of 25.00 as against 29.00 recorded in 2014. While the mean performance was 31.00 in both 2016 and 2017, it slightly declined again, to 30.00 in 2018. There was a better performance of candidates in 2021 with a raw mean score of 40 and standard deviation 10.00 as against 11.45 recorded in 2020. The implication of the inconsistent students' performances in Biology is that Nigeria's developmental efforts towards the use of Biology as one of the key disciplines to achieve scientific and technological advancement as well as sustainable development may be hampered because Biology and its associated bio-based technologies have been reported to have significant impact on sustainable development (Onanuga *et al.*, 2020; Choudhury, 2015). And this is not good for the nation because any nation that must be scientifically and technologically advanced must work towards developing a suitable level of Biology education (Sallau *et al.*, 2018).

In senior secondary school across West African countries, students are exposed to various science subjects; of which Biology is one of the prominent and more prevalence. Biology is a branch of science that boosts the development of scientific attitudes in students. It is a branch of science that studies life (Ramalingam, 2011; Okafor *et al.*, 2020). Biology is required for further learning, training and development for many science-related professional courses such as agriculture, botany, biotechnology, biomechanics, medicine pharmacy, zoology, conservations biology and ecology (Larkum, 2011). Similarly, Neteiyin (2014) observed the crucial role of biology as a discipline in contributing to financial, physical and aesthetic benefits of humanity and nation building. Biology also gives individual a better correlate understanding of himself, the environment, appreciate the nature and also control the activities within the environment base on his knowledge of the subject. It exposes individuals to the

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necessity of maintaining good health through the use of 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.

Education comes with teaching and learning experiences in a classroom which is anchored or supervised by a trained teacher and who also ensures a conducive learning environment. This agrees with a global monitoring report by Dinah (2013) who opined that learners in supportive environments will possess high levels of self-efficacy and self-motivation and use learning as a primary transformative force. In a quote from that Report "Welcoming the learner – child, youth or adult– in an environment where they can feel safe and nurtured is very important for the development of each individual and the society. However, several factors such as individual, environmental, and psychological factors among others influence students' meaningful learning which in turn influences their performance. The level at which students engage in learning and instructional activities could be influenced by students' self-concept factors.

Self-concept is a perception every human has about himself. It is an element of personality development which shows what the individual is and how he/she fit into the world (Laryea *et al.*, 2014). Therefore, self-concept is usually seen as attributes, characteristics, qualities and capabilities of individuals. It also includes; deficiencies, limits and values among others that individual perceive of themselves. This in other words could be term as available data concerning one's identity as perceive by him or her. Laryea *et al.* (2014) opined that these are set of attitudes that one assign to him/her or attributes that can be used to describe one's self. An individuals' self-concept is formed through his/her perception, personal experiences and interactions with the

environment and other individuals. Self-concept has been reported to influence students' academic achievement in science and mathematics among secondary school students (Klapp, 2018; Martin *et al.* quoted by Xia *et al.*, 2019). Self-concept can be categorized into academic self-concept, social self-concept, religious self-concept and physical self-concept.

Academic self-concept is seen as how an individual student views his/her academic ability compared to others. Therefore, for an individual to succeed academically he must have a positive academic self-concept. Academic self-concept can be classified into general academic self-concept and subject specific self-concept such as self-concept in language, mathematics, and Biology among others Laryea *et al.* (2014). For example, students' self-concept in mathematics has been reported to predict mathematics achievement (Watson *et al.*, 2019). This could imply that success in Biology will require students to have positive self-concept in Biology. Researchers have reported positive relationship between academic self-concept and performance (Omran & Saleh, 2019; Laryea, 2014). On the contrary, others reported negative relationship between academic self-concept and performance (Hoge *et al.*, 2012; Ajuwo, 2018).

Students' academic self-concepts could also be influence by an individual social selfconcept. Social self-concept involves students believes and perception about their peer relationship, group membership and peer acceptance (Klapp, 2018). Trusty *et al.* quoted by Zhao *et al.* (2021) reported that that there is a negative association between social self-concept and students' academic performance. This could imply that low social selfconcept could lead to low academic performance while high social self-concept could be associated with improved academic performance. Physical self-concept is the individual's perception of themselves in areas of physical ability and appearance. Physical ability includes concepts such as physical strength and endurance, while appearance refers to attractiveness. Students' performance can also be influence by their self-esteem/self-efficacy, and students' gender and age.

Students performance could also be gender related. Gender, according to United Nations Educational, Scientific and Cultural Organization, UNESCO (2012), refers to socially and culturally constructed meaning given to the person of different biological sexes. The concept could also mean the expectation held about the characteristics, attitudes and behaviors of both men and women. Gender seems to influence individuals' perception or opinions of phenomena and thus could influence performance. Hence an individuals' self-concept could be influenced by his/her gender. Self-concept and given the proceeding, there seem to be inconsistency on the influence of academic selfconcept on students' achievement. Moreover, if students in Biology class can develop high positive self-concept of themselves, they could as well perform greatly in Biology. However, the relationship between self-concept and performance in Biology has not been established nor research as most of the review work is diverse and contradictory. Again the issue of gender difference in self-concept and performance in Biology has not been resolved and therefore subject to further investigation. While this study looks into the self-concept as a predictor of students' achievement, the resultant effect, it is believed when disseminated and implemented in Niger state senior secondary school will help improve the students' academic achievement in subsequent Senior Secondary Certificate Examination (SSCE) Biology.

1.2 Statement of the Research Problem

Several factors have been identified in literature to be responsible for secondary school students' poor performance, as it relate to students' academic self-concept (Ramon, *et al.*, 2019; Ogundiwin *et al.*, 2019). Factors responsible for poor performance include;

inadequate instructional materials, poor teaching methods and psychological factors among others. Research studies have been conducted to address these issues and found to enhance students' performance. However, no significant improvement has been made as it relates to students' academic performance in Biology among students in Minna, Niger state. (See: *Record of Students Performance in Biology, WAEC May/June Examinations 2012-2017* Appendix D, 124). However based on the knowledge of the researcher most of the studies on self-concept as predictor of students' academic performance were carried out outside the country. From the forgoing, not much was reported in literature on the influence of self-concept as a predictor of students' performance in Nigeria. Thus, the need to investigate self-concept as predictor of Students of State Nigeria becomes necessary, hence the motivation for the study. Base on divergent opinions on self - concepts and students' academic performance, this study therefore intends to investigate self - concepts as predictor of Biology performance among secondary school students in Minna metropolis of Niger state, Nigeria.

1.3 Aim and Objectives of the Study

The study investigated self-concept as a predictor of Biology performance among secondary school students in Minna Metropolis, Niger State.

Specifically, the study achieved the following objectives:

- i. Determine the perception of secondary school students' academic self-concept in Minna.
- ii. Find out the relationship between academic self-concept and Biology performance among secondary school students in Minna.

- iii. Find out the relationship between social self-concept and Biology performance among secondary school students in Minna.
- iv. Determine the relationship between physical self-concept and Biology performance among secondary school students in Minna.
- v. Determine the relationship between gender and Biology performance among secondary school students in Minna.
- vi. Determine the relationship between academic self-concept, social self-concept and physical self-concept and Biology performance among secondary school students in Minna.

1.4 Research Questions

For the purpose of this study, the following research questions were raised and answered using mean and standard deviation.

- What is the perception of secondary school students' academics self-concept in Minna?
- ii. What is the relationship between academic self-concept and Biology performance among secondary school students in Minna?
- iii. What is the relationship between social self-concept and Biology performance among secondary school students in Minna?
- iv. What is the relationship between physical self-concept and Biology performance among secondary school students in Minna?
- v. What is the relationship between academic self-concept, social self-concept and physical self-concept and Biology performance among secondary school students in Minna?

vi. What is the relationship between gender and Biology performance among secondary school students in Minna?

1.5 Research Hypotheses

The following null research hypotheses were formulated and tested at 0.05 significant level.

- **HO**₁:There is no significant relationship between academic self-concept and Biology performance among secondary school students in Minna.
- **HO**₂: There is no significant relationship between social self-concept and Biology performance among secondary school students in Minna.
- **HO**₃:There is no significant relationship between physical self-concept and Biology performance among secondary school students in Minna.
- **HO4**: There is no significant relationship between gender and Biology performance among secondary school students in Minna.
- **HO5**: There is no significant relationship between academic, social and physical selfconcept on Biology performance among secondary school students in Minna.

1.6 Scope of the Study

The scope of the study covered the influence of student factors such as self-concept and demographic factors on Biology performance among Secondary School students in Minna. Geographically the study was restricted to Minna Metropolis, Niger State. **Minna** is a large place in the region of <u>Niger</u> in <u>Nigeria</u> with a population of approximately 291,905 people and is one of the <u>largest places in Niger state</u>. The city is a fast developing urban centre in North-Central Nigeria. It is located between Latitudes 8°20' N and 11°30' N and between Longitude 3°30' E and 7°20' N, and lies wholly with

the physical and cultural zone of transition described as the "middle belt of Nigeria". Kaduna and Federal Capital Territory border the State to both North-East and South-West respectively. Minna has a total land area of 74,344 km2 wide and it is approximately 8% of the land area of the country. The distance from **Minna** to Nigeria's capital (Abuja) is approximately <u>121 km</u> / 75 mi (as the crow flies).

Three homogenous residential densities of low, medium and high were recognized in Minna. These residential areas are characterized by social, economic and physical patterns. The city of Minna is the administrative Capital of Niger State in Nigeria. Figure 1 shows map of Nigeria and the location of Niger State in the colored portion. Also, Figure 2 shows the map of Niger State and the location of Minna within the state.

Therefore, the study area is Bosso and Chanchaga Local Government Areas of Niger State. SSII Biology students were sampled for the study. The study was also limited to the use of questionnaires to elicit respondents' opinion on academic self-concept, social self-concept and physical self-concept. The study lasted four (4) weeks.

1.7 Significance of the Study

The study focused on self-concept factors as determinants of Biology performance among secondary school students in Minna, Niger State. The result of this study would be of great importance to Parents, Students, Teachers, School Administrators, Policy maker and Curriculum planners. The parents would have the knowledge of the need to encourage their wards to promote self-concept as a factor that can influence their academic performance.

The students might be the direct beneficiaries of the findings of this study because it would help students particularly in Minna to understand the influence of their individual factors such as self-concept and how it influence their academic performance hence the need to develop a positive self-concept about themselves as they engage in Biology learning.

The result of this study would help teachers understand the effect of self-concept as factor that influence academic performance by this they would act as assistance in helping students develop good self-concept about themselves and also adopt teaching methods that would boost their self-concept.

It would provide relevant information that government can use in providing adequate training and professional developments that can equip the teachers with knowledge to help students develop positive academic self-concept which could in turn leads to the improvement in academic performance.

The results would provide policy makers with empirical data and scientific knowledge on students' academic self-concept and its influence on students' academic performance. This information would be useful in developing policies that could enhance the quality of education and improves students' performance which has been of enormous concern to educational stakeholders.

The findings would also help curriculum planners with data that would be used in developing and designing schemes of work that would enhance positive self-concept which could improve their performance in Biology.

1.8 Operational Definition of Terms

Academic performance: students' aggregate scores in Biology over a session or knowledge attained, scores obtained, or skills developed in Biology over a year.

Academic Self-Concept: refers to secondary school Biology students' perceptions on their academic capability.

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Gender: refers to the description of respondents (students) with regards to their sex; male or female (boy or girl).

Physical self-concept: refers to the individual's perception of themselves in areas of physical ability and appearance. Physical abilities include concepts such as physical strength and endurance, while appearance refers to attractiveness.

Self-Concept; refers to the measurable attributes, and characteristics, qualities and capabilities as it relates to Biology student and how they perceive themselves.

Social Self-Concept: refers to the way secondary school Biology students' attitudes, attributes, characteristics, feelings and perceptions about their social status which includes financial, communication ability etc. about oneself when compared with others.

Secondary school students: in the study refers to secondary school Biology students that participate in the activities.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Framework

2.0

The conceptual framework took cognizance of the prospective factors from different literature to derive the three major variables; the dependent, independent and moderating variables. The dependent variable is students' academic performance while independent variables are that of physical, social, academic, age and gender. The moderating variables include students' related factors of age and gender, and learning environment. The conceptual framework is illustrated in Figure 1.



Figure 2.1: Conceptual Framework for Examining Students Self-concept and their Academic Performance

Source: Adapted from John et al. (2014)

The figure 2.1 above summarizes the factors that influence students' attitude and their academic performances. It has been generally adopted that academic performance is influenced by students self-concept which are the independent variables listed in figure above and the study agrees that the academic performance could be influence positively. The relationship between the independent variables, criterion variable that include student's factors (age and gender), as illustrated in the figure 2.1. The criterion

variables are believed to ignite the potency of independent variables on the dependent variables. Apart from many problems bedeviling the secondary school system ranging from inadequate facilities, old and dilapidated structures, inadequate instructional materials and unqualified teachers as narrated by (Phillias & Wanjobi, 2011), are all components of the criterion variables. However, the study criterion variables laid emphasis on age and gender. The general argument is that, if student's self-concept constructs of physical, social and academic are viewed positively or are in good shape, couple with right attributes of the criterions variable or right perception of age and gender, it will influence the academic performance positively.

There is an established relationship between the various independent variables. For instance, students' academic self-concepts could also be influence by an individual social self-concept. Social self-concept involves students believes and perception about their peer relationship, group membership and peer acceptance (Klapp, 2018). Asma *et al.* (2010) has also laid emphasis on the fact that there is a negative association between social self-concept and students' academic performance performance while high social self-concept could be associated with improved in academic performance.. This could imply that low social self-concept could lead to low academic Academic self-concept is seen as how individual view his or her academic ability or strength in comparison to others. Therefore, for an individual to succeed academically he must have a positive academic self-concept and subject specific self-concept such as self-concept in Biology among others (Laryea *et al.*, 2014). For example, students' self-concept in mathematics has been reported to predict mathematics achievement (Lee & Kung, 2018). This could imply that success in Biology will require students to have positive self-concept in Biology.

In nutshell, it can be deduced from the conceptual framework that dependent variable comprises outcomes of independent variables that are academic performance, achievement and attainment. However, the three variables are interdependent in such a way that it influences each other in its real lifelong learning processes.

2.1.1 Self-concept theory

Self-concept is generally defined as an individual's view based on self-knowledge or experienced formed through interaction with environment and attributes of the person's behavior (Wischgoll et al., 2019). Self-perception are said to drive behavior which in turn further influences the way we perceive ourselves (Anderson et al., 2019). Selfconcept could be seen as individual' perceptual image; how one sees himself or herself. This implies that the general thought of an individual concerning his or her behavior and abilities in taking a task is self-concept (Nduji et al., 2020). Someone could have personal perception of himself as a good person at all dealing and that is such persons" conception about him. In a learning environment, some students may perceive themselves to be dull academically, and therefore should not be expected to have excellent performance in examination. This is why Uier and Yousuf (2010) defined selfconcept to be a composite image of what people think, care, what we perceive, what we can achieve, what we think others think of us and what we would like to be. To Liu and Wang (2012), self-concept could be well understood from the developmental point of view. They noted that self- concept is developed through students' experience within the environment which could influence their behavior, choice of peers, actions and persistence in academic task.

Nalah (2014) in his work defined self-concept as an organized and consistent way of individuals thinking, feelings and reaction to issues concerning them arising from

personal life experiences. Gliebe (2012) stated that every born child would experience development of self-concept from birth through their emotional attachment with their mother. This implies that the quality of their interaction that exist between the mother and child will determine or affect the child's self-concept either positively or negatively. So, students' positive perception is vital in achieving success throughout life, while the success in children's lives depends on both cognitive ability and emotional skill as well.

Self-concept constitutes one of the factors that influence one's image impacting their behavior, attitude and responses. Weiten et al. (2014) stated that one of the principle factors among individuals is self-concept and it is a critical issue that can influence individual's attitudes towards life, environment, behavior and relationship with others and various cultures - This is also supported by (Aida, 2016). Bosch and Wilbert (2020) also explained that self-concept is a self-appraisal individual created through ones' interaction with his or her environment as well as the influence of significant others. It is one's self-perception which he surmised to have been originated from attitude, feeling, ability, appearance, social acceptance and knowledge about ones' skills. Sandeep and Choudhuri (2017) believed that positives self-concept would be an extremely important goal for educational programs to promote, and held that it was linked to positive outcomes including higher academic achievement and effort. Experience gotten from interacting with the environment could either be negative or positive effect to the students. Thus, students' self-concept could be either negative or positive. When a student possesses low self-esteem about himself or herself, it is said to be negative self-concept (Lafata, 2015). And such student may likely experience depression, high level of stress, and loneliness. Positive self-concepts on the other hand have the attribute of "can do" attitude or the ability of an individual to complete tasks with or without help (Gomez, 2012). Positive self-concept is often valued as a desirable

outcome in many disciplines such as educational development, sports and exercise, health, social personality, psychology and academic achievement (Herrera & Mohamed 2020). According to John *et al.* (2019), there are three factors identified to influence the degree to which students form positive or negative self-concept: Their own prior behaviors and performance, the behaviors of other individuals toward them and the expectations that others hold for their future performance.

Based on the varying qualities in which individual possess self-concept it is suggested to be termed as positive and negative self-concept. It is also based on the quantity in which individual display self-concept which is classified into low or high self- concept. Self- concept could be seen as the extent to which people agree they are capable, significant, successful and worthy, it also entails beliefs about oneself and judgment about one's own abilities and popularity (Nalah, 2014).

2.1.2 The development of self-concept

There are some questions about individual personality; for example: who are you? In which the response will come from internal sense of who we are. According to Ackerman (2021), this sense is developed early in life, but it goes through constant evaluation and adjustment throughout the lifespan. In psychology, this sense of self has a specific term- "self-concept". Self-concept is an overarching idea we have about who we are—physically, emotionally, socially, spiritually, and in terms of any other aspects that make up who we are. Individuals' self-concept is form and regulate as we grow, and based on the knowledge we have about ourselves. It is multidimensional, and can be broken down into these individual aspects.

Basically, the reason why some children try new things with enthusiasm and approach peers and adults with confidence, and other children seem to believe that they are incapable of succeeding in many situations is because a child and adults tends to behave consistently with the way they see themselves. Young children's beliefs about whether they can or cannot do things, therefore, influence how they approach new situations. In turn, their success in new situations affects the way they see themselves-in a seemingly circular process. Ackerman, (2021) defined self-concept as the individual's belief about himself or herself, including the person's attributes and who and what the self is."

It is pertinent to differentiate between self-concept, self-image, self-esteem, and selfconfidence so as to understand the factors that may influence the development of selfconcept. There is need also to recognize the relationships among self -concept, perceived competence, and locus of control.

The terms self-concept and self-image are often used interchangeably to designate a global conception of self. This global self-concept is made up of many dimensions. The first is self-esteem which refers specifically to our self-evaluations or our judgments about our own worth. Self-concept refers to other aspects such as physical characteristics, psychological traits, and gender and ethnic identity. Our self-esteem may be affected by possessing culturally valued traits, such as helpfulness and honesty. It is also influenced by seeing that others perceive us as significant and worthy or possessing culturally valued traits. Self-image is how an individual sees themselves, and it does not have to align with reality. A person's self-image is based on how they see themselves, while self-concept is a more comprehensive evaluation of the self, largely based on how a person sees themselves, values themselves, thinks about them, and feels about them. Carl Rogers posited that self-image is a component of self-concept, along with self-esteem or self-worth and one's "ideal self" (Ackerman 2021; Natalia, 2021).

Self-esteem is that ability that enables one to perceive competency in oneself. It is the perceived competence that in turn reflects our beliefs about our ability to succeed in a particular task. A feeling of competence will also compel one to effectively master ones' environment. So when children begin to have that perception of them gaining competency in a growing sphere, the more they tend to have a feeling of their ability to control their environment. This sense of personal control is often referred to as an internal locus of control. In contrast, external locus of control means decisions are in the hands of others or of fate. Therefore, self-concept will be more differentiated into multiple domains as children grow. Self-concept and self-esteem development commence since childhood. It is a continuous process that continues to develop across life span. It is inevitable to have a positive self-concept and elated self-esteem for a satisfied and prosperous adulthood. Although there is a congruent bond between positive self-concept and self-esteem, if Self-concept declines then Self-esteem fluctuates (Batool *et al.*, 2019).

2.1.3 The development stages of self-concept

A. The formation of self-concept during early childhood

Ackerman (2021), identified three general stages of self-concept development during early childhood:

Stage 1: 0 to 2 years-old

- a. Babies need consistent, loving relationships to develop a positive sense of self.
- b. Babies form preferences that align with their innate sense of self.
- c. Toddlers feel secure with gentle but firm limits
- d. At age two, language skill develops and toddlers have a sense of "me."

Stage 2: 3 to 4 years-old

a. Three and four-year-olds begin to see themselves as separate and unique individuals.

b. Their self-images tend to be descriptive rather than prescriptive or judgmental.

c. Preschoolers are increasingly independent and curious about what they can do.

Stage 3: 5 to 6 years-old

- a. They are transitioning from the "me" stage to the "us" stage, where they are more aware of the needs and interests of the larger group.
- b. Kindergarteners can use their words to communicate their wants, needs, and feelings.
- c. Five and six-year-olds can use even more advanced language to help define themselves within the context of the group.

B. Self-Concept in Middle Childhood

During middle childhood (about 7 to 11 years old), children are beginning to develop a sense of their social selves and figuring out how they fit in with everyone else. They reference social groups and make social comparisons more often, and begin to think about how others see them.

Other characteristics of their self-concept at this stage include:

- 1. More balanced, less all-or-none descriptions
- 2. Development of the ideal and real self
- 3. Descriptions of the self by competencies instead of specific behaviors
- 4. Development of a personal sense of self (Jan & Peter, 2014).

B. The development of self-concept in adolescence

Adolescence is where the development of one's self-concept really explodes. This is the stage in which individuals (about age 12-18) play with their sense of self, including a time when they experiment with their identity, compare themselves with others, and develop the basis of a self-concept that may stay with them the rest of their life.

During this period, adolescents are prone to greater self-consciousness and susceptibility to the influence of their peers and chemical changes happening in the brain (Taylor *et al.*, 2021). They enjoy greater freedom and independence, engage in increasingly competitive activities, compare themselves with their peers, and can value (even over-value) the perspective of others (Siobhan, 2021).

In adolescence, there are two important factors that influence self-concept and self-worth:

- 1. Success in areas in which the adolescent desires success
- 2. Approval from significant people in the adolescent's life (Siobhan, 2021).

When students have a healthy sense of self-worth and self-esteem, they contribute to a greater self-concept.

2.1.4 Components and dimensions of self-concept

There are different dimensions which may constitute different kinds of self-concept; for example, the dimensions that create "academic self-efficacy" will not have as much overlap with "social self-efficacy." Some overarching dimensions that researchers understand with the self-concept puzzle include: Self-esteem, Self-worth, Self-image (physical), Ideal self, Identities or roles (social) and Personal traits and qualities (Ackerman, 2021).

According to Rogers, self-concept consists of three components namely:

1. Self-image

Self-image is the way we see ourselves. Self-image includes what we know about ourselves (brown hair, blue eyes, tall); our social roles (wife, brother, gardener); and our personality traits (outgoing, serious, kind). Self-image doesn't always match reality. Some individuals hold an inflated perception of one or more of their characteristics. These inflated perceptions may be positive or negative, and an individual may have a more positive view of certain aspects of the self and a more negative view of others.

2. Self-esteem

Self-esteem is the value we place upon ourselves. Individual levels of self-esteem are dependent on the way we evaluate ourselves. Those evaluations incorporate our personal comparisons to others as well as others' responses to us. When we compare ourselves to others and find that we are better at something than others and/or that people respond favorably to what we do, our self-esteem in that area grows. On the other hand, when we compare ourselves to others and find we're not as successful in a given area and/or people respond negatively to what we do, our self-esteem decreases. We can have high self-esteem in some areas ("I am a good student") while simultaneously having negative self-esteem in others ("I am not well-liked").

3. Ideal self

The ideal self is the self we would like to be. There's often a difference between one's self-image and one's ideal self. This incongruity can negatively impact one's self-esteem. Self-image and ideal self can be congruent or incongruent. Congruence between the self-image and ideal self- means that there is a fair amount of overlap between the two. While it is difficult, if not possible, to achieve perfect congruence, greater

congruence will enable <u>self-actualization</u>. Incongruence between the self-image and ideal self means there's a discrepancy between one's self and one's experiences, leading to internal confusion (or <u>cognitive dissonance</u>) that prevents self-actualization.

2.1.5 Factors affecting self-concept

As a dynamic attribute, an individual's self concept is characterized by the nature of constant feedback (positive or negative) received from the social environment, in which the opinions and assessments of the persons we establish intimate relations with (family, couple, friends), are determinant factors. There are factors that influence the process of the development of self-concept. The nature of parental upbringing is a significant factor. Positive parental upbringing and attitude lead by their children can develop a positive thinking and self-appreciation to themselves. Negative parental attitude will on the other hand create an impression in a child that he or she is not appreciated and loved by the parent because of self-weakness. Every child has the tendency to evaluate who they are through the response of their parents in every action they take. According to Ferro and Tang (2017), if a child lives in a confused and negative parental upbringing, he or she consequently tends to develop negative self-concept.

Another factor is continuous failure in a child's life. This can be attributed to their inability to please their parent or themselves. Thus, this could make the child feels that he or she is useless and as result, negative self-concept is developed in such child. On the other hand, a positive self-concept is developed if a child sees failure as an opportunity for him or her to improve himself or herself in every aspect of decision-making (Marsh & Seaton, 2012).

Depression is the next factor and people who suffer from depression tend to think and response negatively towards everything including evaluating themselves. They keep wondering if surviving throughout their lives can be possible. They can be super sensitive to what other people say about them or act towards them.

Lastly on this note is the internal self-critic which can also influence the process of the development of self-concept. The fact that internal self-critic is not needed in evaluating every actions and decisions that we take in our life cannot be disputed, however, internal self-critic functions as a regulator in every action taken and how we behave so that we can be accepted by the society around us and can adapt well within the society (Hills, 2018).

However, some other factors that can influence individual's self-concept are; education, media, appearance, culture, abuse, relationships, gender, income and age.

- 1. Education: Education can influence an individual's self-concept by having supportive teaching staff who continues to encourage a student to keep up the good work. Also, another factor that can influence an individual's self-concept is the lack of employment due to having a poor education. Education can impact on a person's self-esteem if they cannot get into employment and the person will get a negative self-image and low self-esteem.
- 2. Media: Media can influence an individual's self-concept through provision of educational sources such as, promoting enrolment on academic courses and information on current situation happening in our society. A further reason that can influence an individual's self-concept is displaying of images of models or celebrities being underweight.
- **3. Appearance:** Appearance can affect an individual's self-concept both constructively and harmfully. For example, appearance constructive influence will be pictures displayed by sports encouraging individual's to keep up a healthy lifestyle. Further more, appearance can have a negative influence on a person's life

through advertising photos of underweight models and this can influence young women to look very thin.

- 4. Culture: Majority of the studies focus on the divergence between Western culture, characterized by a more dependent auto-conception of the self, and Asian culture, in which interdependence stands as the fundamental factor in the development of self-concept. Culture is a belief that you have or self-values. This can influence our self-concept if we do not endorse other individual's culture. Cultural diversity can have a positive influence if we embrace the differences of others, but if differences are used to discriminate against others, is harmful. Also, this can be the way you were brought up by your parents or a guardian.
- **5. Abuse:** There are different types of abuse; they are physical, emotional, neglect and sexual. These or any type of abuse can be detrimental to a person, however, abuse can influence a person if they have been neglected and they will develop a low self-esteem. In addition, a person that has been neglected may feel socially excluded and may suffer from mental health conditions.
- 6. **Relationships:** Relationship can influence an individual's self-concept if you do not have a supportive family or peers. This may lead the individual to have a negative self-concept with socialization. Furthermore, having high expectations can also have a negative self-concept of an individual, additionally if the person has been compared to other peer groups or siblings can have a negative influence.
- 7. Gender: Gender is characterized by being a man or woman. This categorization can influence a person's self-concept of stereotyping job roles for both genders. For example, men should play football and women should stay at home and cook the meals also take care of the children. Overall, the study of gender differences in self-concept in adolescence has generated considerable interest in recent decades.
Despite the fact that the results of these studies are varied, most of them concluded that there are clear gender differences in self-concept, so that girls, particularly after the age of twelve, tend to have worse self-concept than boys. Thus, according to research, age acts as a moderating variable of the differences between girls and boys. Finally, since these factors may influence an individual's self-concept everyone should be treated equally regardless of their gender.

- 8. Income: Income can influence individual self-concept if they do not have enough income they may be despair that they cannot afford to live a normal life. For example, with insufficient low income a person cannot maintain their lifestyle factors, such as paying their rent, afford heating facilities within their home plus having a balance diet.
- 9. Age: It can be said that self-concept can fluctuate throughout different life stages, for example. Also, age can influence a person's self-concept during childhood and adolescent development. Through comprehending his ideal self- receiving peer pressure. The definition of oneself from 5-6 to 7-8 years provides an ability to discriminate between different domains of experience. Between 7-8 years and 11-12, there are significant changes in regard to intellectual abilities and social environment, having remarkable implications for both self-concept and self-esteem. During this range of age, children have the ability to compare themselves to others, but the information extracted from such comparisons is just in service of self-evaluation.

At the end of childhood, there is an increase in the permeability to social values, so the prototypes of each culture become another valuable source of comparison, which, in most cases, contribute to the discrepancy between the 'real self' and 'ideal self' (Maureen, 2015).

2.1.6 Academic self-concept and academic performance

Students' self-perceptions about their academic capabilities form an important part of their adjustment in school. These self-perceptions play a significant role in directing students' efforts towards their academic work (Bakari & Musa, 2013). There are two differing perspectives of academic self-concept as suggested by (Chih *et al.*, 2018). The first perspective asserts that like general self-concept, academic self-concept is also hierarchical and multi-dimensional based on specific subjects. For example, these may be English self-concept or mathematics self- concept. Educational psychology provides compelling support for this perspective (Parker, 2012). This is so because, important academic outcomes are substantially related to academic self-concept.

The second perspective views academic self-concept in-dimensionally, such that academic achievement is influenced more by the broad notion of academic self-concept often measured by overall Grade Point Average. Researchers with this orientation, measure academic self-concept broadly using overall academic achievement, as opposed to examining subject specific perceptions. However, it is very important to understand how students are feeling about their performance' strength academically since previous researchers have already established a relationship between academic achievement and academic self-concept.

In an attempt to determine the direction of the relation between academic self-concept and academic achievement, literature shows that three models; (a) the self enhancement, (b) skill development and (c) the reciprocal effects have been useful (Liu in Alrehaili, 2015). According to the self enhancement model, academic self-concept is a determinant of academic achievement. This means that academic achievement is a consequence of academic self-concept. On the contrary, the skill development proposes that academic self-concept is a consequence of academic achievement. To this model, improving students' academic performance is achieved by enhancing students' academic self-concept. This means that the models reveal that the direction of the causality is towards one direction. This has generated a lot of controversy among researchers. As a compromise between the self-enhancement and skill development models, the reciprocal effects model emerged. According to this model, academic self-concept and academic achievement are reciprocally related and mutually reinforcing. That is, prior academic self- concept affects subsequent academic achievement and prior achievement affects subsequent academic self-concept (Herbert *et al.*, 2019).

In order to determine the direction of causal relationship between academic self-concept and academic achievement, Liu in Acharya and Gupta (2021), stipulated that students who have less satisfying academic performance may or will develop less positive academic confidence, which in the end, may lead to lower academic self-concept. On the other hand, students with less positive academic self-concept are more likely to lack learning motivation, which may result in poor academic performance. Thus, his conclusion was that academic self-concept and academic achievement tend to affect and determine each other. This conclusion is in agreement with the suggestion made by Gaisie, (2020) that academic self-concept is the cause as well as an effect of academic achievement in that, prior academic self-concept influences subsequent academic achievement beyond the effects of prior academic achievement.

Asma *et al.* quoted *in* UK Essays (2018), observed from other research that there is a persistent and significant relationship between the self-concept and academic achievement and that change in one seems to be associated with change in the other.

Meaning that if a student is able to develop positive self-concept about him/her, same students can have a better academic performance. Likewise good academic performance can change the students' perception about him/her. Sandeep and Choudhuri (2017), concluded that academic self-concept and academic achievement were strongly correlated.

2.1.7 Social self-concept and academic performance

According to Simon *et al.* (2021), peer relations are said to be critically important factor in child development. Interaction with peers provides a context for cognitive development, evolution of self-concept, special skills development, and the establishment of moral and social values. Numerous research findings have proved that childhood problems in peer relations are difficult to adjust in adulthood. This simply means that children who were not familiar with their peers in childhood tend to have difficulties making friends in the future.

Some studies have found that students with high social self-concept usually get along well with their peers. Handel *et al.* (2013) investigated students with high ability that was unpopular with average and popular groups on measures of achievement, family social status, and personality adjustment. Results showed relatively little difference between average and popular students, but unpopular students were distinguished by lower social self- concept and academic self-esteem, as well as by less prestigious paternal occupations. They did not differ on measures of academic achievement, emotional autonomy or anxiety. Therefore, the researcher proposed that unpopular students could be counsel with more focus on their social self-concept rather than concentrating on academic ability.

The relationship among four measures of children's social competence was examined teacher completed measure of children's social behavior, child's self-report measure, behavioral measure and socio-metric measure and their relationship to an academic measure by Hecht and Vagi (2012), it was indicated by findings that children with high academic scores were liked and interacted positively with their peers. Negative peer interaction was not related to the popularity of the students, while positive peer interaction was negatively correlated with peer dislike. Teacher's ratings show that teachers can identify the children who are liked and disliked by their peers in the classroom. The child self-report measure show few correlations with other measures. Self-perceptions of social competence may influence interpersonal behavior in ways that affect the quality of peer relations as indicated (Patterson *et al.*, 2018). Few studies have examined the relationship between adolescent peers and their educational outcomes. Findings from the study suggest that, peers may have some influence on adolescent's academic achievements. This has been confirmed by O'Hara et al. (2021) in their study which stated that adolescents who spend greater time hanging out with peers had lower levels of mathematics and science achievement in the 12th grade than adolescents spending less time with peers.

Some authors Tali *et al.* (2014) have also suggested that children experiencing peer problems tend to display a negative pattern of self-perceptions, including low perceived special competence, low self-efficacy, and low expectations for social outcomes and peer evaluations. Mendelson *et al.* (2016) conducted a study to evaluate the relations among peers status, self, and other perceptions of social competence among 9 and 11 years old children. Self-esteem and self-perception in various domain and teacher's evaluations was assessed along with peer's status. A cluster analysis revealed that rejected children could be assigned to 1 of 2 groups with respect to self-perceptions,

one displaying high self-perception and the other low self-perception. In contrast, popular children showed positive self-perceptions. Neglected and average children showed no difference in self-perception scores, whereas controversial children displayed lower self-esteem and perceived competence on the academic.

Simon *et al.* (2021) pointed out that exploration of the behavioral and personality characteristics of children who exhibit difficulty with peer relationships has become a research priority. The amount of research documenting links between adolescents, individual level characteristics and their achievement motivation, only a single longitudinal study was identified that a relationship between adolescents peer networks and their achievement motivation.

2.1.8 Physical self-concept and academic performance

Only little available evidence have shown that children who are physically active and fit tend to perform better in the classroom, and that daily physical education does not adversely affect academic performance (Simon *et al.*, 2021). According to Jordan *et al.* (2014), evidence supporting the association between physical activity and enhanced academic performance is strengthened by related research that found higher levels of physical fitness to be linked with improved academic performance among children. Kyeong *et al.* (2020), also indicated that two main national studies in Australia and Republic of Korea together with two conducted in United States of America found physical fitness scores to be significantly and positively related to academic performance and promote on-task classroom behavior. It is therefore important to note that the cognitive and behavioral responses to physical activity breaks during the school day

have not been systematically investigated among middle or high school students (Valerie *et al.*, 2017).

Findings of studies conducted on relationship between physical self-concept, social selfconcept and academic achievement were conflicting. Kolawole and Kojigili (2015) concluded that there was no significant correlation between physical appearance and academic achievement. Maqbool *et al.* (2020) revealed in their study that physical activity level was quite an independent entity that was not related to academic achievement. Haroona *et al.* (2018) however, concluded that sport and academic achievement appear to have a mutual influence on each other.

2.1.9 Self-concept and performance

Different types of relationships have been analyzed by educational psychology, both associative and predictive, that existed between self-concept and academic performance (Popoola, 2018). However, there are no conclusive studies that clearly identify the direction of the link which joins these two variables. In results obtained, one perceives different extraneous variables that can alter the results to differing degrees (Amanda *et al.*, 2020). These authors indicate the need to differentiate four possible patterns or causal models between self-concept and academic performance.

 Academic performance determines self-concept: Experiences of success or failure in academic significantly affect the pupil's self-concept and self-image more than vice versa, this being explained by the role of evaluation by significant others, or by the theory of social comparison. Given that the influencing variable is academic performance, psycho-pedagogic interventions should give priority to modifying the students' level of achievement, since this will contribute to changing the level of self-concept.

- 2) Levels of self-concept determine the degree of academic achievement: Likewise for this causal relationship model, there are implications for applying important educational decisions. Given that self-concept is what determines levels of academic achievement, and self-concept in turn can be strongly influenced by contingencies provided by the pupil's significant others, among whom we must not underestimate teachers (Pygmalion principle), we can infer that it would be possible to increase levels of school performance by previously optimizing levels of self-concept and very specifically levels of perceived competence.
- The third model of causal relationship postulates that self-concept and academic performance influence and determine each other mutually.
- 4) Other authors who support this model postulate the existence of additional variables that may be the cause of both self-concept and of academic performance, among which we might find personal and environmental variables, academic and non-academic variables.

In addition, the beneficial effects produced by a good level of self-concept have been substantiated. In studies (Lu *et al.*, 2017) where subjects with a high self-concept were compared with other subjects with low self-concept, teacher reports show that they consider the high self-concept students as more popular, cooperative, and persistent in class work, with lower anxiety levels, more supportive families and higher expectations of future success.

However, for this study purpose, the researcher examined the issue from the perspective of the reciprocal effects model which, in summary, holds that academic achievement and self-concept are related to each other. This model was described by Ehm *et al.* (2019) as the process where "prior self-concept affects subsequent achievement and prior achievement affects subsequent self-concept". This framework

was chosen because although there is agreement about the relationship between academic self-concept and academic achievement, researchers do not agree about the order that each of these factors take place. There is debate whether academic achievement results from self-image, or whether self-image influences self - esteem, or whether the concepts are interrelated. Researchers have found three distinct models regarding the causal ordering between self-concept and academic achievement. They are the self enhancement model, the skill development model and the reciprocaleffects model (Alrehaili, 2015).

This model of reciprocal-effects was chosen for this study because the focus of the research was to examine the relationship between how students perceive themselves physically, socially and academically, while also observing and analyzing their performances.

2.1.10 Concept of biology

The word biology is derived from the Greek words "**bios**" meaning life and "**logo**" meaning study and is defined as the science of life and living organisms. An organism is a living entity consisting of one cell e.g. bacteria, or several cells e.g. animals, plants and fungi. Biology is a branch of science that deals with the study of many varieties of lives. It is concerned with the study of living organisms including their structure, function, growth, distribution and taxonomy. In other words, Biology is the study of the structure, function, heredity and evolution of all living things: micro-organisms, fungi, plants and animals (Okenyi, 2015). Aspects of biological science range from the study of molecular mechanisms in cells, to the classification and behaviour of organisms, how species evolve and interaction between ecosystems.

The study of Biology is broad in scope but with many concepts that unifies all the aspects of the subject. The study of different organisms and the approach to the study are classified under sub-disciplines in biology; for examples, the study that examines the rudimentary chemistry of life is called Biochemistry, the study of complex interaction among biological molecules is known as Molecular biology, zoology is the study of animals, Botany studies plants, Physiology is concerned with the physical and chemical functions of organs and tissues. Other aspects of Biology include parasitology, algaelogy, microbiology, pathology, entomology and evolutionary biology.

Biology is important because it helps us understand how living things work and how they function and interact on multiple levels, according to the Encyclopedia Britannica. Advances in biology have helped scientists do things such as develop better medicines and treatments for diseases, understand how a changing environment might affect plants and animals, produce enough food for a growing human population and predict how eating new food or sticking to an exercise regimen might affect our bodies (Alane, 2020).

2.1.11 Biology education

Biology Education can be explain as such which generally aims at training individuals to understand himself or herself, the parts of his or her body and how the body parts function. Hence, the application of principles of education in teaching and learning of biology is known as biology education. It is the art of teaching and training in order to inculcate or transfer the knowledge of biology to students (Okenyi, 2012). For this can afford them the opportunity of contributing meaningfully to the development of the society in one way or the other. Okenyi (2015) described Biology as a body of knowledge pivotal for the successful understanding of other fields of science such as botany, anatomy, physiology, microbiology, medicine, agriculture, pharmacy, and biotechnology. It is the basis for the survival of mankind because there is no area of human existence that does not encompass the usage of Biology. Sallau *et al.* (2018) stated that application of Biology can be found in the areas such as Bio-fermentation, Biofuels, Bioinformatics, Bioremediation and many more. And further discuss that the knowledge of Biology and Biology education are central to achieving sustainable development. Sustainable development is the ability of the current generation of human beings to meet their needs without jeopardizing the possibilities of future generation to meet their own needs.

2.1.12 Objectives of biology education

The study of Biology can have a multitude of aims and objectives largely; it is studied to allow a person to enter a specific field of employment. Other aims for studying Biology are intellectual, ethical and pragmatic: to increase knowledge about all types of organisms, to encourage greater benevolence in the relationship between humans and the natural environment and to implement biological skills into various technologies or management techniques.

The study of Biology aims to increase understanding of living systems and to allow one to consider the systems in relationship to the self and other organisms in the natural environment.

The major objectives of Biology education in Nigeria are

i. To provide the youth with sound knowledge of the basic principles and techniques of Biology.

- To produce knowledgeable, highly motivated, professional and effective teachers of Biology who will be able to develop in students an appreciation and understanding of biological processes and principles.
- iii. To develop confidence in Biology teachers and enhance the ability to adapt to the changing situation in science and the technological oriented society.
- iv. To develop confidence in Biology teachers and enhance the ability to adapt to the changing situation in science and the technological oriented society.
- v. To view Biology as a processes of inquiry into the living world.
- vi. To analyze the activities of living things in their environment.
- vii. To demonstrate practical skills in handling scientific apparatus.
- viii. To demonstrate excellence and professional competence in teaching secondary school Biology.
- ix. To inculcate positive scientific attitude and value in the society and promote positive disposition towards Biology, science and the scientific enterprise.
- **x.** To apply concepts and methods acquired in new areas of study and in everyday situation

2.1.13 Importance of biology education

1. It helps to promote the individuals' understanding of the man's relationship with environment as well as knowledge of the interrelationship existing between living and non-living things that abound in the environment.

2. The skills include the ability to observe, communicate, identify problems, ask questions, formulate hypothesis, analyze data, make inferences and predictions.

3. The carefulness, open-mindedness and acceptance of warranted generalization.

4. It helps to prepare the individual for vocational selection such as in Pharmacy, Medicine, Teaching, Agriculture, etc. 5. It helps to increase the individual's interest and aesthetic appreciation of nature.

6. It helps to stimulate the individual's interest in biologically-based hobbies such as growing flowers, collecting insects, etc thereby encouraging leisure activities for individual enjoyment.

7. It helps to impart factual knowledge and stimulate scientific reflective thinking so as to produce a better informed individual.

8. It helps to inculcate in the individual scientific skills and attitudes in his approach to personal and social problems.

9. Study of the importance of plants in botany makes us understand their role in human survival. They are the resources which provide many of the basic needs like food (for both humans and animals in the form of carbohydrates, proteins and fats), clothing (they are the largest supply of fiber as cotton required to make cloth), shelter (as they provide interior and exterior furniture), medicines (as they are greatest sources of medicine).

10. Study of animals in vital because it helps in better study on animals useful to humans like those: which provide food (eggs, milk, honey & meat) which contribute in clothing (wool from sheep), which are dangerous when encountered by man etc. some of the animals are useful in making drugs and medicines useful to man. For example many of the anti-bodies are prepared by using animals as reservoirs. We can also understand the role of animals in maintenance and balance of the environment.

2.2 Theoretical Framework

Like many topics within psychology, a number of theorists have proposed different ways of thinking about self-concept and some of them include;

2.3.1 Behaviorist theory

This theory seems to be appropriate to the study because the term behavioral in the context of behavioral and education has become innovating and alternative approach to

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learning (Justo *et al.*, 2017). It has been viewed as an aspect of studies that deals with human decision (Schluter *et al.*, (2017). According to De-Wit *et al.* (2016) who also stated that behavior could be what people say or do. Rudin and Radin (2019) viewed the mind as a black box in the sense that response to stimulus can be observed quantitatively, totally ignoring the possibility of thought processing occurrence in the mind. It is a theory that believes in action.

Behavioral theories can play a critical role in "closing the loop" and bridging the theorydriven and data-driven approaches. They are ever more important for researchers in the era of big data analytics, ABM(Agent-Based Modeling), CA(Computational Agent), and all other novel modeling approaches for three reasons. This can be summarized by Kant's statement that "theory without data is blind, but facts without theories are meaningless" (Smith-Sparks *et al.*, 2016).

First, theories have the power of answering not only the descriptive "what" but also when, how and why" (Elragal & Klischewski 2017; Davis *et al.*, 2015). Behavioral theories enable the inclusion of qualitative and language-based realms such as psychology and sociology to the mathematical realms. Moreover, learning for the constructivists is the construction of personal perceptions of reality according to one's personal experiences. It can be stated here that although learning is defined differently, the overall objective of it is some form of behavioural display by the learner. We see that for the behaviourists, learning is said to have taken place when the learner shows change in behaviour. For the cognitive theorists learning occurs when the learner portrays the behaviour of ability to process cognitive structures. We also see that for the constructivists, the final end of the construction of personal perceptions of reality is some particular behavioural disposition that goes with the way one perceives reality. Therefore, it can be stated with confidence that the whole educational complex process of learning is anchored on behaviourism in one way or another.

Essentially, another aspect that can be perceived as a contribution of behaviorism to education is the use of lesson objectives during the instructional process. It is vital to state that learning objectives are actually behavioral objectives in that they set standards on how the learners are expected to behave at the end of the learning experience. Behavioral objectives show the overall purpose of any learning experience such that without them, a lesson can be said to have no direction or an intended goal.

2.2.2 Social identity theory

Self-concept is composed of two key parts: personal identity and social identity. The former includes the traits and other characteristics that make each person unique while the later refers to how we identify with a collective, such as a community, religion, or political movement (Kendra, 2020). According to Bruce as cited by Kendra (2020), suggested that there are six specific domains related to self-concept:

- i. Social: the ability to interact with others
- ii. Competence: the ability to meet basic needs
- iii. Affect: the awareness of emotional states
- iv. Physical: feelings about looks, health, physical condition, and overall appearance
- v. Academic: success or failure in school
- vi. Family: how well one functions within the family unit

Studies on the relationship between self-concept and academic achievement have become prevalent in recent years. Most of the researchers studying this issue have reported that there is a mutually reinforcing relationship between academic selfconcept and academic achievement (Arefi *et al.*, 2014).

The importance of self-concept stems from its notable contribution to personality formation. Self-esteem has to do with social competence, since it influences how the person feels, how he or she thinks, learns, values himself or herself, relates to others, and ultimately, how he or she behaves (Karanikola *et al.*, 2018). Looking at the theoretical model and definition proposed by (Shavelson *et al.*, in Yildiz & Alpkan 2015), who opined that self-concept, is the perception of individual about his or herself formed from experience and the relationship they have with the environment. Self-concept, as a component of human personality development, has its own nature and peculiarity.

Many authors have made effort to specify the nature of the term self-concept. To this end, they see it as a compendium of seven characteristics or fundamental aspects which include; a psychological dimension; it is multidimensional; it has a hierarchical organization (a general self-concept and specific self-concepts); it is stable, but as we go lower on the hierarchy, self-concept becomes more specific and more susceptible to change; the different facets of self-concept become more differentiated among themselves with age and experience; self-concept includes both descriptive as well as evaluative aspects; self-concept can be differentiated from other constructs which it is related to, such as academic performance (Shavelson *et al.*, quoted by Huitt, *2018*).

Ferro and Tang (2017), make his contributions that general or global self-concept will be determined by the degree of importance that we assign to each of its specific components. If, when describing ourselves, our value judgments are satisfactory, then we obtain a positive global self-concept; in the opposite case we generate negative feelings and thus produce a negative global self-concept.

2.2.3 Self-concept theory

Theorists generally agreed that self-concept is the overall idea we have about who we are and includes cognitive and affective judgments about ourselves. Self-concept is multi-dimensional, incorporating our views of ourselves in terms of several different aspects (for example social, religious, spiritual, physical, emotional). It is usually influenced by biological and environmental factors, while social interaction plays a big role too. Its development is usually through childhood and early adulthood when it is more easily changed or improved upon. According to Cherry, 2018 and Gecas (1982), Self-concept does not always align with reality. When it does, our self-concept is "congruent." When it doesn't, our self-concept is "incongruent".

2.2.4 Carl Roger's self theory: real and ideal self

According to Carl Rogers (1949), it is vital for an individual to fully understand oneself for it is the key to further define one's personal identity. Thus, he defined **self-concept** as the image of oneself with the knowledge that the self is the center of experience. He argued that the self develops from interactions with significant people with valuable experiences. He further stated that human beings always strive for the best and **selffulfillment** or **self-actualization**.

With reference to one of the remarkable statements of Carl Rogers' remarkable statements, he stated that the curious paradox is that when I accept myself just as I am, then I change. With his concept of Self Theory, he categorized self-concepts into two components, namely: the real self and the ideal self. In his opinion, the real self is consist of all the ideas, including the awareness of what one is and capable of doing. While on the other hand, the ideal self is the person's conception of what one should be

or what one aspires to be which includes our goals and objectives in life. Thus, having a clear and positive self-concept will help one to become better versions of oneself.

The theory that gives meaning to this study is Carl Roger's Humanistic Theory of Personality Development propounded by Carl Rogers in 1949. He 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 subjective reality or phenomenal field. These include external objects and people as well as internal thought and emotions. The person's motivation and environment both act on their subjective reality.

Carl Rogers believed that 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. Carl Rogers again 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.

Carl Roger's Humanistic Theory of Personality Development has some implication to this study. That is when an individual is loved, cared for and feel protected; his selfconcept will be boosted hence aligned perfectly with reality, which will consequently lead to positive relationship in his academic achievement.

2.2.5 The psychology of gender: what are the different perspectives?

Arguments surrounding gender reliably centered on the assumed 'naturalness' of gender roles, that penises lead to masculinity and vaginas lead to femininity. On the other hand, Judith Butler in Gender Trouble defines gender as the repeated stylization of the body, a set of repeated acts within a highly rigid regulatory frame that congeal over time to produce the appearance of substance, of a natural sort of being. Based on this view, it is about performance rather than essence, with 'the body as a kind of canvas on which culture paints images of gender'.

Generally, gender identity has three main psychological explanations. These are psychodynamic theory, social learning theory, and cognitive-developmental theory. All focus on early childhood, that is, up until about seven years of age.

1. Psychodynamic Theory

Psychodynamic theories, With reference to Sigmund Freud's psychoanalytic theory, Psychodynamic theories focused on unconscious drives, the relationship of the child and early experiences with the parents (or primary caregivers).

Gender is a core part of personality that rests on the child's awareness of its anatomy and its identification with the same-sex parent. The same-sex parent is viewed by girls as responsible for their loss of a penis, while boys fear that their penis will be taken away by the same-sex parent. This resentment is somehow resolved, and the child aligns with the same-sex parent. Thus, fear of the loss of the penis is a more abstract concept to males while for females, the loss is already apparent. Based on this view, the male role is stronger than is the female and must work harder to deal with uncertainty

2. Social learning theory

Social learning theory stresses the child's environment and learning experiences. Based on this view, gender roles are learned through a mixture of observing the behaviour of others and modeling. Habitually, children recognise the differential behaviours of boys and girls, and the treatment by others in the form of rewards or punishments for appropriate or inappropriate actions. In addition, children equally experience individual differences in treatment, which starts at birth with physical handling, clothes and toy choices and patterns of speech.

Social learning theory offers some explanation of how modelling and reinforcement interact, and considers cognitive factors. Notwithstanding, it tends to underplay individual differences in development and reactions from others such as inconsistencies in behavioural reinforcement. It also underplays the agency of children and how they actively make sense of the world.

3. Cognitive-developmental theory

The cognitive-developmental theory revealed that as children we mature and experience the world, reorganizing mental processes as we progress through a series of stages of development. Generally speaking, children's development hits various milestones moving from the simple to the complex and from the concrete to the abstract, including language development. Children are active agents in acquiring gender roles within development stages that allow for an increasingly sophisticated grasp of concepts and language. As a result, as children mature, discrepancies between their knowledge and their experiences of the environment affects their ideas and performance accordingly. The acquisition of gender constancy, stability and consistency can only happen when a child has reached a certain level of cognitive maturity.

In line with this view, gender identity exists at several levels, possibly developing in same vain with language. A strong position that emerges from the theory's view is that boys, more so than girls, value their own gender more highly. This offers some support for the psychodynamic view that boys must not only try harder but perform better.

2.3 Empirical Studies

2.3.1 Relationship between academic self-concept and students performance

Academic Self-Concept (ASC) connotes "personal beliefs of individual which he or she develops about his or her academic abilities or skills". A person's ASC develops with mental and physical growth right from early childhood "Self-concept is an important construct in development psychology and education and had multidimensional construct, one general facet and several specific facets, one of which is 'academic self-concept". However, parents and educator could have influence on academic self-concept.

Hanan et al. (2016) carried out study on the relationship of academic self-concept and Students performance among school age students in Cairo, a descriptive correlation design with a purposive sampling comprising of 182 school age children and their teachers. The results of their findings indicated that there was a significant statistical relationship between academic self-concept and students' performance among school age children. This implies that academic self-concept and academic performance directly affect each other. It was also revealed that there was a low correlation between academic self-concept and students' academic performance from the Pearson correlations statistic of 256 and supported by a significant p-value of .045 respectively. It implies that the students' self-concept was positively related to their academic achievement. Academic self-concept for example: how one understands himself as an individual who has a set of unique characteristics. "Their beliefs and opinions are based on their sensitivity and self-awareness about their strength and weakness. Establishment of one's Academic self-concepts is built by the person's nature, maturity, and his natural surroundings". They were of the opinion that important people that buildup of Academic self-concepts are parents, adults, peers and one's own self. Similarity of this study with that of Shabana and Mona is the relationship that has been established between academic self-concept and students' performance. This study also will determine the relationship between selfconcept and students' performance in Biology in particular. While their study was centered on school age students and without reference to particular subject, this study is centered on specific class of students in secondary school. The differences are found in the research design, sample size and sampling technique.

Savid (2011), also investigated Relationships between academic self-concept and academic performance in high school students using a sample that consists of 363 students both male and female between the age of 15 - 18 from 10 high schools, which were chosen by using multistage cluster sampling method. In order for the researcher to study self-concept and comparison of the academic self-concept questionnaire, the Self -Concept Questionnaire (SCQ) of Saraswat (1984) was used. The self-concept inventory provides six separate dimensions of self-concept, which are, physical, social, intellectual, moral, educational and temperamental. The research finding revealed a close relationship between academic self-concept and measures of academic performance. He strongly believed that academic self-concept powerfully predicts the general performance in literature and mathematics. His study was based on three objectives that directed his research: Firstly, to determining correlation between made questionnaire and total score of SCQ, which revealed that academic self-concept questionnaire has high correlation with total score of Saraswat self-concept scale (0.67). With this he was able to validate the academic self-concept. Secondly, he sought to verify to what degree academic self-concept and total self-concept is associated with performance in essential subject matters (literature or mathematics) and comparing this data together.

The results were shown in Pearson correlation coefficients between academic and all correlations coefficient between academic self-concept, total self-concept and academic performance marks is significant. Therefore, he confidently said that students' self-concept is valid predictor of their academic performance. Both test correlation with mathematics mark is higher than literature score, but was not regarded enough for being significant (0.04). Also, there is a correlation between academic performance both mathematics and literature (.38). The third hypothesis expressed was that academic self-concept questionnaire predicts academic performance better than Saraswat self-concept scale (SCQ). Of which he used dl & d2 difference test. The results showed that the relationship between academic self-concept and literature and mathematics marks is stronger than the relationship between total score of Saraswat self-concept scale and academic performance of these two lessons. Therefore, he opined that academic self-concept questionnaire is better predictor than Saraswat self-concept scale for academic self-concept questionnaire is better predictor than Saraswat self-concept scale for academic self-concept scale for academic self-concept questionnaire is better predictor than Saraswat self-concept scale for academic self-concept questionnaire is better predictor than Saraswat self-concept scale for academic performance.

This correlation study is closely similar with the work of this researcher as both adopted same research design, same sampling method and the numbers of schools involved are same. This study is also considering two out of the six dimensions of self-concept in the study i.e. physical and social self-concept. However, this particular study is not age restricted but age and gender of student's forms part of the independent variables for the study.

Sandeep and Choudhuri (2017) conducted a research with the aims to examine the relationship between academic self-concept and academic achievement of secondary students and to compare the academic self-concept of male and female secondary students. Sample of the study were students of secondary school between the ages of 14 – 17 years. 615 of both genders (Male 317, Female 298) were selected from 15

secondary schools of Varanasi city, India. This sample size is almost equal the sample for this study. They used self-reported Cumulative Grade Point Average (CGPA) of the previous year to measure academic achievement. But this study used previous years WAEC performance of students in Biology as evidence to support the necessity of this study. They adopted Kamble and Naik (2013) Academic Self Concept Scale (ASCS), to measure academic self-concept, which was composed of 57 items, distributed in 8 subscales namely Academic Ability, Academic Interests, Study, Examination, Academic Interaction, Academic Efforts, Curriculum, and Academic Future. The result of the study revealed that there was a positive relationship between academic selfconcept and academic achievement and this relationship was stronger for female students (r = .28) than that of male students (r = .17). Moreover, gender differences in the academic self-concept of the students were also found. Female students had significantly higher academic self-concept than male students.

From the results of their study, it was revealed that (49.92%) of secondary school students have average level of academic self-concept. and 26.34% students show high academic self-concept while 23.74% students had low academic self-concept. Their result also showed a positive and significant relationship (r = .23, p>.01) between academic self-concept and academic achievement of secondary school students.

Their study supports the view that students' positive belief about their capabilities and academic competence are important to be successful in their educational achievement. Comparing the academic self-concept of male students and female students revealed a significant difference between the academic self-concept of male students and female students and female students. It means that both male and female students at secondary level were not same in the view they hold about their academic belief and capabilities.

Sandeep and Rashmi in their study refutes the finding of Hossaini (2002) which revealed that gender does not influence the self-concept and self-concept does not play any significant role in influencing academic achievement. Perhaps, the differences in academic self-concept of male and female students are due to the fact that they differ in their respective concerns. They reported that adolescent girls are more concerned about being liked; more affected by others' opinion about them, have commitment and belief in hard work while boys place more importance on the intrinsic motivation of feeling intelligent, high confidence in their intelligent and ability when they look at their academic competence. They also noted that female students had relatively higher mean score for CGPA (N = 298, M= 7.82) than their male counterparts (N = 317, M= 7.62). and that female students' academic self-concept was found to be higher than the male students. On the basis of their finding they opined that higher academic self-concept is accompanied with higher academic achievement. Therefore, they concluded that academic self-concept is positively related to academic achievement and in supports of the self enhancement model which claims that academic self-concept is a prerequisite to enhance academic achievement Marsh and Martin (2011). If students perceived themselves as academically competent and positive belief about their effort, then they can obtain higher grades because their academic self-concept will motivate the students autonomously at school.

Niepel *et al.* (2014) carried out a study to examine longitudinal relations between academic self-concept, achievement goals and achievement in mathematics. The work examined the confound hypothesis by investigating the incremental validity of achievement goals and secondly the work examined the predictive validity of achievement goals for changes in academic self-concept. From the study it was discovered that achievement goals predicts achievement but after controlling academic

self-concept also the study shows that performance-based not mastery goals predicts academic self-concept changes over time.

Abdulrahim and Siti (2017) studied the relationship between academic self-concept and academic achievement among UITM centre of football athletes. The study was a correlation and descriptive research where the respondents were expected to complete an academic self-concept scale questions which consist of subscales namely academic confidence and academic effort. 150 students took part in this research. The researcher discovered that there is a weak positive relationship between academic confidence and academic achievement also there is weak positive correlation between academic effort and academic achievement. A difference between this study and their research is seen from the type of academics on which the research focused on.

Raed and Jarmas (2014) carried out a study on learning environment as a predictor of mathematics self-efficacy and achievement. The research was done among high school students in Israel. 900 students participated in the research. Classroom climate questionnaire and mathematical self-efficacy questionnaire were used in the research. The findings show that there is a strong positive correlation between the dimensions of class climate – satisfaction and enjoyment, the teacher's support, rules and instructions, competitiveness - and between mathematical self-efficacy and achievements, and weak negative but significant correlations, between the indices of classroom climate- lack of gender equality, tension and difficulty- and between mathematical self-efficacy and achievements.

The difference between their research and this study is that they have considered external factors as determinant of academic performances of students in high school, while this study is based on personal factors. The study also involved different subjects, population and different geographical area. However, those factors they considered could entails physical and social factors, whereas, this study entails physical and social self-concept of students.

Emmanuel and Hammed (2013) examined the home and school factors as determinants of students' achievement in senor secondary school economics in Botswana. 200 students were randomly selected for the work. The Home Factor Scale (HFS) and School Factor Scale (SFS) questionnaire was used to collect data from students. The study shows that achievement in Economics can be predicted by combination of students' home and school factors. Though, this study of home and school factors may look different from the factors this research is looking at. But these could as well be classified as social factors as this study includes social self-concept as a determinant of students' performance in Biology.

Banjoko *et al.* (2015) examine the extent to which school factors determine senior secondary school students' achievement in chemistry. 200 chemistry students were involved in the study drawn from five secondary schools in Sagamu local government area of Ogun state. The cross-sectional survey design was adopted. Descriptive statistics, simple percentage and analysis of variance were used to analyze the data. The results show that if the factors (science library facilities, instructional materials and availability of library facilities) are improved, students' performance in chemistry will improve.

The study of this researcher is specific to chemistry subject and was limited to fewer secondary schools in a given local government area. This particular study is adopting a quantitative correlation design to investigate personal factors (self-concept) rather than external factors that influences academic performance. Descriptive statistic of mean and standard deviation will be used. However, the studies are similar in the sense that they both examine determinant of academic performances of secondary schools students.

2.3.2 Relationship between physical self-concept and student performance

Physical self-concept is theorized as a core element in facilitating motivation, psychological well-being, and health-related behavior (Harter, 2012; Marsh et al., 2006). Craven and Marsh (2008) note that people who feel good about their appearance and physical capabilities are more likely to maximize physical potential, fitness, and mental health compared to those who do not. Physical self-concept is theorized as an important health outcome in and of itself as well as an antecedent, mediator, and moderator of health-related outcomes.

Garn (2016) in his study of Students' physical self-concept beliefs was of the opinion that "Students' Physical Self-concept beliefs" are an important psychological outcome of quality physical education. These beliefs also facilitate other important outcomes such as student engagement and physical activity behavior. Garn study cuts through the edge of applications of multidimensional models of physical self-concept theories in physical education contexts. He also identified the role of cognition in the development of physical self-concept beliefs, including an extensive review on how students' frames of reference can aid or diminish growth. Fox, in Garn (2016) were of the opinion that physical self-concept is a key indicator of mental health and promotes students' motivation (Garn and Wallhead, 2015) and physical activity behavior (Marsh *et al.*, 2006).

Lohbeck *et al.* (2021) examined the relationship between children's physical selfconcept, motivation, and physical performance: does physical self-concept or motivation play a mediating role. Intrinsic and extrinsic motivation as well as physical performance of 1,082 children aged 7–8 years were used as for the study to contrast a mediation model assuming physical self-concept as a mediator of the relations between both types of motivation and physical performance to a mediation model assuming both

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types of motivation as mediators of the relations between physical self-concept and physical performance. Questionnaires named Physical self-concept were employed by the researchers, while physical performance was measured with 10 motor skill tests. All tests were carried out during regular school hours (8-12 A.M.) by qualified test personnel. Beyond correlation analyses, structural equation modeling (SEM) were used to analyzed the evidence for the predictive relations between the variables under study. Results showed that physical self-concept was significantly positively related to both types of motivation and physical performance (all p < 0.001). In contrast, results of SEM revealed that only physical self-concept (p < 0.001) and intrinsic motivation (p < 0.001) 0.05) were significantly positively linked to physical performance. Furthermore, physical self-concept proved to significantly mediate the relations of both types of motivation to physical performance (p < 0.001), while only intrinsic motivation, but not extrinsic motivation, proved to significantly mediate the relation between physical selfconcept and physical performance (p < 0.05). These results suggest that school-based or extracurricular interventions targeted at improving younger children's physical performance only by means of an increased level of physical activity or by external factors without supporting children's physical self-concept and intrinsic motivation may have less or no effects on their physical performance. The similarities of the study are found in the use of questionnaire, research design. The difference here is, the topic is examining one of the predictors which is physical self-concept, the location were the study is being carried out, level of school student used for the study.

Haroona *et al.* (2018) examined the relationship between sports participation, parental support, self-esteem and academic achievement due to concern about reduced education level of students and serious lack of research regarding this issue in Pakistan. 248 students from three universities of Pakistan (male = 188; mean age = 17.5, SD = 1.15;

female = 60; mean age =17.3, SD = 1.18) were selected for the study, in which questionnaires were used to measure parental support, sports participation, and self-esteem. Two scales were used to measure parental support (school based parental support and sports participation based parental support). Sports participation level was measured using an adapted version of The Physical Activity Index (PAI) Scale consisting of 3 items. Rosenberg self-esteem scale assessed self-esteem. The data was analyzed using the structural equation modelling. The findings show no direct relationship between sports participation and academic achievement.it also reveals parental support and self-e esteem as mediators in the relationship between sports participation and academic.

Kim and Ahn (2021) studied the effect of the changes in physical self-concept induced by exercise participation on the changes in global self-esteem and mental well-being. 189 university students in Seoul, Korea was selected as sample size for the study. A survey measuring physical self-concept, self-esteem, and mental well-being before and after a six-week exercise course was employed by the researchers. Regression method was used to analyzed the data collected. The results of their findings shows that physical self-concept changed by exercise participation might directly and positively influence mental well-being, and it can indirectly influence the changes in mental well-being via the improvement of self-esteem. the similarities of the study are found in the use of questionnaire, research design and method of data analysis. The difference here is, they are examining the effect of the changes in physical self-concept induced by exercise participation on the changes in global self-esteem and mental well-being. 189 university students in Seoul, Korea while this study is on self-concept as a predictor to biology performance among secondary school student in Minna, Niger state.

2.3.3 Relationship between social self-concept and students performance

Femandez *et al.* (2016) carried out study to clarify the relationship between personality factors and job satisfaction by the mediatory role of emotional intelligence. The study involved 440 academic staff were drawn selected by multi-stage sampling from public research universities in Klang Valley, Malaysia. The cross-sectional survey design was adopted. Pearson correlation coefficient, multiple linear regression analysis, and mediation analysis (Sobel test) were used to analyze the data. The results shows a positive correlation between emotion perception, utilization of emotion, managing own emotions, managing others' emotions, conscientiousness, agreeableness, and openness with job satisfaction. The study also more sheds new light in the context of psychology, particularly in the job satisfaction context among academic staff at universities.

Moliner and Alegre (2020) studied the effects of peer tutoring on students' mathematics self-concepts. The Marsh questionnaire was used to measure students' mathematics self-concepts before and after implementation of a peer tutoring program. A pretest posttest control group was employed by the researchers. 376 students from grades 7 to 9 (12 to 15 years old) participated in the research. There was no statistically significant differences were reported between the pretest and the posttest for any of the control groups. Statistically significant improvements were reported for all grades for the experimental groups. An average increment of 13.4% was reported for students in the experimental group, and the overall effect size was reported to be medium (Hedges' g = 0.48). No statistically significant differences were reported across grades for the experimental group. The main conclusion of their study was that same-age and reciprocal peer tutoring may be very beneficial for middle school students' mathematics self-concepts. Several recommendations for field practitioners emanated from the study: use same-age and reciprocal tutoring over cross-age and fixed peer tutoring. The research is different from this study in the sense that, they are looking at effects of peer

tutoring on students' mathematics self-concepts which focus on one categories of selfconcept, research design employed was experimental which is also different from this research work.

2.3.4 Relationship between self-concept and biology performance

Hajia *et al.* (2018) worked on the predictors of academic performance in Biology among public secondary school students in Kwara State, Nigeria. In this research, survey and correlation research design and the simple random sampling technique was used. 242 Biology teachers from 293 secondary schools, from 16 local government areas were involved in the research. The data was analyzed using SPSS. From the study, it was revealed that there exist a significant relationship between teachers' qualification, experience on student's academic performance. It also reveals that there is a strong positive relationship between physical facilities, school laboratories and students' academic performance, moderate positive relationship between physical facilities and students' academic performance.

This research work is similar to this study based on the fact that, they both adopted same research design, involving same subject i.e Biology, they both study public schools and used same SPSS package for data analysis. The only difference involve is that of the predictors of students performance. While Hajia is looking at teachers' qualification and experience as factors that influences students' performance in Biology, this study is looking at students' self-concept as predictors of performance in Biology.

Okafor *et al.* (2020), conducted a research in Imo state, Nigeria on "Self-concept and gender as Correlates of academic achievement among secondary school students. Three research questions were raised that guided the study and three null hypotheses were tested at 0.05 level of significance. They adopted a correlational survey research design

with the population of the study consisting of 2,412 senior secondary (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 was of 473 senior secondary (SS2) biology students (200 males and 273 females) drawn 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). The reliability coefficient was 0.76. Person's product moment correlation coefficient was used to answer the research questions while multiple regressions were used to test the three null hypotheses. The result of their study revealed that there was positive significant relationship between secondary school students' self-concept and academic achievement in biology. Their 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 their findings, it was recommended 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. This study is similar and closely related to this very research study as both studies are adopting same research design and same sampling techniques. However, the location of the study and the population are different.

Nduji *et al.* (2020) conducted research with the aim to ascertain test anxiety and selfconcept as a predictor of biology students' academic achievement in Enugu state. In this research, survey and correlational research design was used. 365 senior secondary two (SS2) biology students was drawn from public secondary schools in Onitsha Education zone of Anambra state. Biology Test Anxiety Scale (BTAS); Self-concept Rating Scale (SRS) and Biology Achievement Test (BAT) questionnaire was used to collect data from students. Descriptive statistics, simple percentage and analysis of variance were used to analyze the data. The result shows that the variation in students' achievement in biology that can be attributed to their test anxiety is not significant. Also that there is no statistical significant variation in students' achievement in biology that can be attributed to their self-concept; there is statistical significant variation in students' achievement in biology that can be attributed to their test anxiety based on school location; and there is statistical significant variation in students' achievement in biology that can be attributed to their self-concept based on school location.

The similarities of the study are found in the research design, class of biology students (SS2). The research is different from this study in the sense that, they are looking at test anxiety and self-concept as a predictor for students achievement in biology coupled with teacher's' factor and school location while this study focus on a single component self-concept which divided into academic self-concept, social self-concept and physical self-concept.

2.3.5 Empirical on students' performance in biology

Olalere *et al.* (2019) examine gender perception of the use of ICT for classroom instruction among Biology Teachers in Minna Metropolis. Survey research design was employed.100 biology teachers (63 male and 37 female) were drawn from all the Senior Secondary Schools in Minna metropolis of Niger State. The questionnaire designed by the researchers were used to collect data from biology teachers. Mean and standard deviation were used to analyzed the study. The results of their findings indicated that both male and female biology teachers in Minna metropolis of Niger State have the same perception that the use of ICT for classroom instruction as an effective instructional strategy. The research is different from this study in the sense that, they are

looking gender perception of the use of ICT for classroom instruction among Biology Teachers in Minna Metropolis but similar in the area of same location.

Katcha *et al.* (2018) worked on effects of Mind Mapping Instructional Approach (MMIA) on senior secondary school biology students' academic achievement in evolution in Minna, Niger State, Nigeria. Pretest posttest control quasi experimental design and Simple random techniques were employed for the study. 105 senior secondary school II students consisting of 56 females and 49 males were drawn for the study. Questionnaire named Biology Achievement Test in Evolution (BATE) developed by the researcher was used for data collection, validated and tested for reliability using Cronbach alpha. The findings show that the group taught using MMIA (experimental group) performed better than students taught with the conventional lecture method which is the control group. Similarity of this study with that of Katcha *et al.* (2018) is students' performance in biology in particular, location which is Minna, Niger state. The differences are found in the research topic, design, sample size and sample technique.

Kuta *et al.* (2017) investigated the relationship between the availability of Biology Laboratory facilities and academic achievement among senior secondary school students in Minna Metropolis, Niger State. Correlation survey design was adopted by the researchers. 53 students were randomly selected from the total population of final year Biology students ranging to 3,761. Questionnaires were used to analyze the data collected. Pearson Product Moment Correlation formula was used to analyze the data and the results revealed that deficiency in the availability of laboratory facilities affects students' achievement in Biology. Comparison in gender achievement showed that female students' achievement exceeded that of male despite the fact that they face the same challenges in terms of inadequacy of laboratory facilities. Similarity of this study with that of Kuta *et al.* (2017) is on biology student's performance carried in the same location, with same research design. The differences are found in the study showing self-concept as predictors to biology performance among senior secondary school in Minna metropolis, Niger state. Also, the differences are found in sample size and data analysis used for the study.

Gambari et al. (2016) investigated the impact of flipped classroom instructional model on students' achievement and retention of mammalian skeletal system in Minna, Niger State, Nigeria. Quasi-experimental non-equivalent, non-randomized, pre-post-test control group design comprising of an experimental group (n=83) with group learning treatment and a control group (n+76) was employed by the researchers. Questionnaire named Biology Achievement Test (BAT) and Field Trial Validation Questionnaire (FTVO) with reliability coefficient of 0.70 and 0.84 respectively, were used for the study. The ANCOVA were used to analyze the data. The results show that the students taught the concept of Mammalian skeletal system using flipped classroom instructional model out-performed their counterpart taught the same concept using conventional lecture method both in achievement and retention; and both the male and female students in the experimental group improved their achievement and retention in which no significant difference was observed after the treatment. Similarity of this study with that of Gambari et al. (2016) is carried out in the same location which is Minna Niger state, same subject centred. The differences are found in research study, research design and sample technique.

Babagana *et al.* (2018) investigated the effect of Constructed Model of Human Urinary System on Senior Secondary School Biology Students' Academic achievement and Retention in Biology in Minna Metropolis. The researchers employed pre-test post-test control quasi experimental design the study. The simple random sampling was used to
drawn three (3) secondary schools in Minna Metropolis which were randomly allotted to experimental and control group. A total of 95 senior secondary school II Biology students was used for the study. A week after the posttest, post posttest was given to test for their Retention on the concept being taught. The findings reveals that the group taught with Constructed Model (experimental group) performed better and had good retention than students taught with Conventional Lecture Method which is the control group. Government, Schools management and teachers should realize that teaching with constructed models enhances learning. Similarity of this study reviewed is that research are carried out in same location used Biology students but different in research title, research design, method of data analysis.

Idris *et al.* (2013) investigated status of biology practical in senior secondary schools in Edati local government area of Niger state. The sample size for the study was 27 biology teachers and 120 SSIII students which were drawn randomly from the six schools. Questionnaire named Status of Biology practical work Questionnaire (SBPWQ) constructed by the researchers were used. The researchers formulated two research questions and two null hypotheses to guide the study. Mean, standard deviation and the null hypotheses which tested at 0.05 level of significance using t-test were used to analyze the data. The findings reveals that the status of practical biology in the schools used for the study was so poor and insufficiently carried out. Facilities for practical biology are inadequate, for instance, there are poorly-equipped laboratories& libraries, inadequate laboratory staff etc.

2.4 Summary of Literature Reviewed

This review of related and relevant research works that has been carried out on selfconcept and its effects on academic performance was divided into Conceptual Frameworks, Theoretical Framework and review of Empirical studies. For the theoretical framework, the study examined the issue from the perspective of the reciprocal effects model, which, in summary, holds that academic achievement and self-concept are related to each other. The conceptual framework took cognizance of the prospective factors from different literature to derive the three major variables; the dependent, independent and moderating variables. The dependent variable is students' academic performance while independent variables are that of physical, social, age/gender and academic. The moderating variables include student related factors of the different stages of self-concept summarized from the early childhood stage, the middle age stage and adolescent stage.

Cognitive development and self-concept development and external factors related to the development of self-concept. Components of self-concept reviewed include self-image, self-esteem and ideal self- as stipulated by Rogers. Some of the factor affecting self-concept reviewed are; parental upbringing, experience of failure in children, depression and internal self-critic. Other relevant factors such as media, age, appearance, abuse among others were stated. Types of self-concept were divided into two major; these are positive and negative with their characteristics. The literature reviewed the relationship between academic self-concept and academic performance which concluded that academic self-concept and academic achievement tend to affect and determine each other.

The concept of Biology and biology education forms the last part of this chapter. This also include the sub-disciplines under biology, the objectives of biology education as well as the importance of biology education were reviewed.

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However, this study is intended to fill up the gap in other reviewed studies. Most of the researchers have considered external factors (learning environment), social factors (home and school factors) as predictor of students' performance and achievement in other science and social science subjects like mathematics, chemistry and economics. Some have as well established the relationship between academic self-concept, social self-concept and academic achievement with preference of gender differences and age range. These studies have not touch the subject concern nor considered the students' personal factors- "self-concept" as it affects or influences the students' performance in Biology. Similar study that was conducted in the review also adopted teachers' qualification as a predictor of academic performance in Biology subject. Hence, this research seek to establish the relationship between the independent variables captured in the conceptual framework (social, physical, academic, age and gender) and students' performance with specific reference to Biology.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

This study employed a quantitative correlational survey research design to investigate self-concept as factors that influence or predict Biology performance among secondary school students in Minna, Niger State. Quantitative research design of this nature helps to describe or explain relationship between the predictor or independent variables (academic, social and physical self-concept) and dependent variable (secondary school students' performance in Biology). This design seeks to clarify phenomena through careful data collection and analysis (Fraenke & Wallen, 2006; Creswell, 2015). This quantitative correlational design will allow the researcher to explain how the predictor variable influenced or define the moderating variable (Creswell, 2015). The survey items only cover the predictors in this study.

3.2 Population of the Study

The population for the study consists of all the Biology students in senior secondary schools from all the 30 schools in Bosso and Chanchaga local governments (17,998) in Niger State, in the 2019/2020 academic session (Niger State Ministry of Education, 2020). The total population for the study comprises Nine Thousand Five Hundred and Forty One Male Students (9,541) and Eight Thousand Four Hundred and Fifty seven Female Students (8,457) that sum up to a total of Seventeen Thousand Nine Hundred and Ninety Eight Students (17,998).

3.3 Sample and Sampling Technique

The target population for the study consists of all Biology students in SSII of senior secondary schools from all the 30 schools in Bosso and Chanchaga local governments. Multistage sampling was used to select the sample size of the study.

First, the schools were stratified into Bosso and Chanchaga local government which is made up of Minna metropolis. The Bosso and Chanchaga local governments comprised of Six Thousand Six Hundred and Thirty Four Students (6,634). In addition, 19 out of the 20 schools in Bosso have male and female Biology students, while 6 out of the 10 schools in Chanchaga have male and female Biology students.

Secondly, 9 schools from Bosso local government out of 19 schools and 3 schools from Chanchaga out of 6 schools that have male and female Biology students were selected in proportion basis i.e. 50%. 10% of the twelve (12) selected schools to make a total of Three Hundred and Seventy-Six (375) male and female Biology Students as the sample size for the study.

School	Male	Female	Total	Male	Female	Total
	Actual	Actual		10%	10%	
Abdullahi Dada	60	61	121	6	6	12
Secondary School						
Makunkele, Minna.						
Bosso Secondary	237	208	445	24	21	45
School Minna						
Day Secondary School,	81	31	112	8	3	11
Garatu						
Day Secondary School	184	200	384	18	20	38
Maitunbi Minna						
Day Secondary School,	95	82	177	10	8	18
Pyata Bosso						
Government Army Day	358	353	711	36	35	71
Secondary School						
Minna.						
Government Science	215	260	475	22	26	48
College						
Chanchaga, Minna.						
Government Technical						
College, Minna	11	26	37	1	3	4
Model Science College,	21	39	60	2	4	6
Tundun Fulani						
Ahmadu Bahago	276	120	396	28	12	40
Secondary Schhol						
Minna.						
Government Day	534	33	567	53	3	56
Secondary School						
Bosso Road, Minna						
Zarumai Model School	183	75	258	18	8	27
TOTAL	1,488	2,255	3,743	226	149	375

Table 3.1 Distribution of Sampled Schools by Gender

Source: Niger State Ministry of Education, Planning Research and Statistics Department (2020).

3.4 Research Instrument

A research instrument named 'Questionnaire on Self-Concepts' (QSC) was adapted from previous researchers Sayid 2011 and modified to suit the purpose of this research study. The questionnaire (QSC) is divided into four major sections (A-D); section A sought demographic information from the respondents' gender, age and school location. Section B sought participants' opinions on their academic self-concept. Section C was focused on secondary school students' opinion or perspectives on their social selfconcept and section D sought opinions of the students on physical self-concept. The instrument for data collection was a structured 4-point scale questionnaire; Strongly Agree (SA), Agree (A) Disagree (D) and Strongly Disagree (SD) with the scale of 4,3,2 and 1 respectively (See Appendix B, p. 116)

3.5 Validity of the Research Instrument

To determine whether the research instruments was actually relevant to the constructs to be measured and how related they are to the set criteria, the construct and moderating validity of the instruments was carried out by Senior Lecturers in science education and psychology expert at Federal University of Technology, Minna. They examined how presentable the research instruments was, and its appropriateness, suitability for target population in term of clarity, depth of coverage and language; that is whether its statement were simple and unambiguous. The face and content validity of the research instruments was carried out by one expert in guidance and counseling as well. Vital inputs were made by all the experts, their suggestions and corrections were affected by the researcher and the research instrument was finally found fit for the research.

3.6 Reliability of the Research instruments

The reliability of the research instruments was determined after conducting a pilot study on 249 students at Day Secondary schools Limawa, Minna and Day Secondary school, Gidan Mongoro, Minna who were among the population but not part of the sample for the main study was used. The researcher carefully administered the instruments once on the respondents and data obtained were analyzed using Cronbach Alpha. A reliability computation on Academic self-concept showed 0.72 alpha level, social self-concept showed 0.71 and Physical self-concept showed 0.82 Cronbach alpha level respectively. The average is 0.85 which is the reliability coefficient of the instrument. Reliability coefficients equal or above 0.70 are considered acceptable (George and Mallery, 2003)

3.7 Method of Data Collection

An introductory letter was collected by the researcher from the science education department, Federal University of Technology, Minna. The researcher presented the letter to the appropriate authorities in the sampled secondary schools in Minna in order to seek permission to have access to the students of the schools sampled for the research. When permission was granted, the researcher randomly selected the required number of students needed for the study. All the respondents (students) were briefed on the objectives of the study and how to fill the questionnaires to ensure that valid data were collected. Ten Biology teachers from the sampled schools were trained as research assistants by the researcher on the rudiments of data collection as regarding the study. Thereafter, the researcher and trained research assistants administered the questionnaires on all the respondents (Students). In order to ensure compliance and complete return of all the copies of the instruments that were administered by the researcher and research assistants, they waited for the period of the administration of the instrument and ensure retrieval of all the completed questionnaires. The filled and completed copies of the questionnaires were collected by the researcher.

3.8 Method of Data Analysis

The data collected from the sampled students were analyzed using descriptive and inferential statistics. All the research questions were answered using descriptive statistics of mean, standard deviation and scattered plot. The inferential statistics, the analysis of variance (ANOVA) was used to test the null hypothesis at 0.05 level of significant. The Statistical Package for Social Science (SPSS) version 23.0 was used for the analysis and presented using statistical tables and charts.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Demographic Distribution of the Respondents

In this section of the chapter tables, pie charts and a bar chart were used to show the distribution of the three demographic variables in this study, which were Gender, Age and School location.

4.1.1 Sample distribution based on gender

The distribution of demographic data of the respondents of this population in terms of gender and the analysis is presented in Table 4.1

	Frequency	Percent%	Valid Percent%	Cumulative Percent%
Male	183	48.8	48.8	48.8
Female	192	51.2	51.2	100.0
Total	375	100.0	100.0	

 Table 4.1: Gender Distribution of the Respondents

Table 4.1 shows the distribution of the sample size based on gender. One hundred and eight three (183) respondents, representing 49% of the total respondents were males. Similarly, one hundred and ninety-two (192) of the total population representing 51% of the respondents were females. This data was be illustrated using a pie chart as presented in Figure 4.1



Figure 4.1: Distribution of the Respondents based on Gender

4.1.2 Sample distribution based on school location

The distribution of demographic data of the respondents of this population in terms of school location and the analysis is presented in Table 4.2.

	Frequency	Percent %	Valid Percent%	Cumulative Percent%
Urban	192	51.2	51.2	51.2
Rural	183	48.8	48.8	100.0
Total	375	100.0	100.0	

 Table 4.2: Sample Distribution based on School Location

Table 4.2 shows the distribution of the sample size based on school location. One hundred and ninety two (192) respondents, representing 51% of the total respondents were urban settlers. Similarly, one hundred and eight three (183) of the total population representing 49% of the respondents were rural settlers.



Figure 4.2 Distribution of the Respondents based on School Location

4.1.3 Sample distribution based on age

The distribution of demographic data of the respondents in this population based on age and the analysis is presented in Table 4.3.

Age	Frequency	Percent%
Less than 15	82	21.9
15 - 18	249	66.4
19 and above	44	11.7
Total	375	100.0

 Table 4.3: Distribution of Respondents by Age

Table 4.3 shows the distribution of the sample size based on age. Respondent between age fifteen below has frequency of eighty-two (82) and 21.9 percent. Respondent between age fifteen to eighteen has frequency of two hundred and forty-nine (249) and 66.4 percent, while Respondent between age nineteen and above shows frequency of forty-four (44) and 11.7 percent. This implies that the larger portions of the sampled students are between age 15 to 18.



Figure 4.3 Distribution of the Respondents based on Age

4.2 Descriptive Analysis of Research Questions

Research Question One: What is the perception of secondary school students'

academic self-concept in Minna?

To answer this research question, mean and standard deviation was used and the

analysis presented in Table 4.4.

 Table 4.4: Mean and Standard Deviation of Perception of Secondary School

 Students' Academic Self-concept in Minna

S/No		Ν	Mean	SD	Remarks
1	I always have good grades in Biology	375	3.51	.624	Positive
2	I have no issues with spelling biological /botanical	375	3.21	.798	Positive
	words				
3	I enjoy studying Biology	375	3.47	.570	Positive
4	I am good in drawing and labeling Biology diagrams	375	3.07	.844	Positive
5	I have no problems pronouncing biological words	375	3.23	.719	Positive
6	Learning Biology enhances my understanding of	374	3.18	.736	Positive
	other science subjects				
7	I do better in Biology than other subjects	375	3.16	.772	Positive
8	Biology is relevant to my daily life activities	375	3.26	.702	Positive
9	Biology is not boring to me at all	375	3.23	.790	Positive
10	I have interest in Biology	375	3.47	.588	Positive
	Grand mean		3.28	0.71	

Table 4.4 reveals the mean and standard deviation of perception of secondary school students' academic self-concept in Minna. All items produced high mean scores which is above the bench mark of 3.0. Above the mean of 3.0 is high while below 3.0 is low. The table reveals grand mean of 3.28 which indicated that biology students in Minna have positive perception about self-concept. Average standard deviation of 0.71 indicating that standard deviation spread in the data set is close to the group mean of the data set.

Research Question Two: What is the relationship between academic self-concept and secondary school students' Biology performance in Minna?

To answer this, the mean and standard deviation of academic self-concept relationship with secondary school students' Biology performance in Minna was presented in Table 4.5, while scatter plot was used as shown in Figure 4.4.

 Table 4.5: Mean and Standard Deviation of Academic Self-concept Relationship

 with Secondary School Students' Biology Performance in Minna

		Std.		
	Ν	Mean	Deviation	
Performance	375	80.76	10.322	
ASC	375	82.00	9.627	
	515	02.00	2.021	

Table 4.5 shows mean and standard deviation of students' performance and academic self-concept. The findings show the computed mean score of 80.76 with Standard Deviation of 10.32 for students' performance and Mean score of 82.00 with standard Deviation of 9.63 for academic self-concept.



Figure 4.4: Shows relationship between biology students' performance and academic self-concept

Figure 4.4 is a scattered plot of the relationship between students' performance and academic self-concept (ASC). The scattered plot indicates that there is a positive relationship between the two constructs with the convergence (homogenecity) of respondents. Therefore, linear regression was used to determine the strength of the relationship.

Research Question Three: What is the relationship between social self-concept and Biology performance among secondary school students in Minna?

To answer this, the mean and standard deviation of social self-concept relationship with secondary school students' Biology performance in Minna was presented in Table 4.6, while scatter plot was used as shown in Figure 4.5.

	N	Mean	Std. Deviation	
Performance	375	80.76	10.322	
SSC	375	84.80	10.063	

 Table 4.6: Mean and Standard Deviation of Social Self-concept Relationship with

 Secondary School Student's Biology Performance in Minna.

Table 4.6 shows mean and standard deviation of students' performance and social selfconcept. The findings show the computed mean score of 80.76 with Standard Deviation of 10.32 for students' performance and Mean score of 84.80 with standard Deviation of 10.06 for social self-concept.



Figure 4.5: Shows the relationship between students' performance and social selfconcept

Figure 4.5 is a scattered plot of the relationship between students' performance and social self-concept (SSC). The scattered plot indicates that there is a positive relationship between the two constructs. Therefore, linear regression was used to determine the strength of the relationship.

Research Question Four: What is the relationship between physical self-concept and Biology performance among secondary school students in Minna?

To answer this, the mean and standard deviation of physical self-concept relationship with secondary school students' biology performance in Minna was presented in Table 4.7, while scatter plot was used as shown in Figure 4.6.

 Table 4.7: Mean and Standard Deviation of Physical Self-concept Relationship

 with Secondary School Students' Biology Performance in Minna.

	Ν	Mean	Std. Deviation
Performance	375	80.76	10.322
PSC	375	58.43	11.256

Table 4.7 shows mean and standard deviation of students' performance and physical self-concept. The findings show the computed mean score of 80.76 with Standard Deviation of 10.32 for students' performance and Mean score of 54.43 with standard Deviation of 11.26 for physical self-concept.



Figure 4.6: Shows relationship between students' performance and physical selfconcept

Figure 4.6 is a scattered plot of the relationship between students' performance and physical self-concept (PSC). The scattered plot indicates that there is a positive relationship between the two constructs. Therefore, linear regression was used to determine the strength of the relationship.

Research Question Five: What is the relationship between academic self-concept, social self-concept and physical self-concept and Biology performance among secondary school students in Minna?

To answer this, the mean and standard deviation of physical, social and academic selfconcept relationship with secondary school students' Biology performance in Minna was presented in Table 4.8, while scatter plot was used as shown in Figure 4.7.

 Table 4.8: Mean and Standard Deviation of Physical Self-concept, Social self-concept, Academic Self-concept and Students' Biology Performance in Minna

Ν	Mean	Std. Deviation
375	80.76	10.322
375	82.00	9.627
375	84.80	10.063
375	58.43	11.256
	N 375 375 375 375 375	NMean37580.7637582.0037584.8037558.43

Table 4.8 shows mean and standard deviation of physical self-concept, social selfconcept, academic self-concept and biology performance. The findings show the computed mean score of 80.76 with Standard Deviation of 10.32 for students' performance and Mean score of 58.43 with standard Deviation of 11.26 for physical self-concept, Mean score of 84.80 with standard Deviation of 10.06 for social selfconcept, Mean score of 80.00 with standard Deviation of 9.63 for academic selfconcept. This implies that the size of the mean difference determines the strength of the relationship. The smaller the mean difference the stronger the relationship, but the larger the mean difference the weaker the relationship.



Figure 4.7: Shows relationship between academic self-concept, social self-concept and physical self-concept on Biology students' performance

Figure 4.7 is a scattered plot of the relationship between students' performance and physical self-concept, social self-concept and academic self-concept. The scattered plot indicates that there is a positive relationship between the two constructs (dependent and independent).

Research Question Six: What is the relationship between gender and academic selfconcept among secondary school students in Minna?

To answer this, the mean, standard deviation and mean difference of academic selfconcept relationship with gender of secondary school students in Minna was presented in Table 4.9, while scatter plot was used as shown in Figure 4.8.

Table 4.9: Mean, Standard Deviation and Mean Difference of Gender andAcademic Self-concept among Secondary School Students Biology Performance inMinna

	Ν	Mean	Std. Deviation	Mean diff
ASC	375	82.00	9.627	80.49
Gender	375	1.51	.501	

Table 4.9 shows mean and standard deviation of academic self-concept and gender. The findings show the computed mean score of 82.00 with Standard Deviation of 9.63 for academic self-concept and Mean score of 1.51 with standard Deviation of 0.50 for gender. The mean difference between ASC and Gender is large (80.49), which might be an indication of the strength of the relationship between the two variables.



Figure 4.8: Shows relationship between academic self-concept and gender

Figure 4.8 is a scatter plot of the relationship between academic self-concept and gender. The scattered plot indicates that there is a positive relationship between the two

constructs. Therefore, linear regression was used to determine the strength of the relationship.

4.3 Research Hypotheses

The following null research hypotheses were formulated and tested at 0.05 significant levels.

HO1: There is no significant relationship between academic self-concept and Biology performance among secondary school students in Minna.

To test this formulated hypothesis, linear regression was used and the analysis is presented in Table 4.10.

Table 4.10a: Linear Regression on Relationship between Academic Self-concept
and Biology Performance among Secondary School Students

Model Summary						
Adjusted R Std. Error of						
Model	R	R Square	Square	the Estimate		
1	.425 ^a	.180	.178	9.357		

a. Predictors: (Constant), ASC

Table 4.10a shows the regression coefficient regression for the independent (predictor) variables; academic self-concept, while the dependent or criterion variable; Biology performance. The result shows r (2,374) = .425, r² = .180. Indicating that 18% of the variance performance can be explained by academic self-concept among Biology students in Minna, Nigeria. To determine whether the model was a good predictor, ANOVA result presented in Table 4.10b.

	Sum of		Mean		
Model	Squares	Df	Square	Fcal.	P-value
Regression	7189.490	1	7189.490	82.118	.000 ^b
Residual	32656.410	373	87.551		
Total	39845.900	374			

 Table 4.10b: Regression ANOVA on Academic Self-concept and Biology

 Performance among Secondary School Students

b. Predictors: (Constant), ASC

Table 4.10b display ANOVA results. The findings shows that there is a significant relationship between the predictors (academic self-concept), and the dependent variable (Biology performance), F(2,374) = 82.12, p(0.00) < 0.05. This indicates that there is a positive relationship between respondents' academic self-concept and Biology performance. Hence the null hypothesis stated was rejected. The regression coefficient is presented in the next Table 4.10c

	Unstan Coefi	dardized ficients	Standardize d Coefficients		
Model	В	Std. Error	Beta	Tcal.	P-value.
(Constant)	43.415	4.149		10.463	.000
ASC	.455	.050	.425	9.062	.000

 Table 4.10c: Linear Regression Coefficient between Self-concept and Biology

 Performance among Secondary School Students

Table 4.10c shows the regression coefficient of academic self-concept and Biology performance. The result shows academic self-concept is a significant predictor of Biology performance (B = .425, t = 9.06, p (0.00) <0.05). The regression coefficient indicates that for any increase in one unit of academic self-concept will cause an increase in 0.425 units of Biology performance (when all other factors are constant) among biology students in Minna, Nigeria.

HO₂: There is no significant relationship between social self-concept and Biology

performance among secondary school students in Minna.

Table 4.11a: Linear Regression Model Summary on Relationship between SocialSelf-concept and Biology Performance among Secondary School Students

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate					
	.581 ^a	.337	.336	8.413					
o Dradiatora	· (Constant) SS	C							

a. Predictors: (Constant), SSC

Table 4.11a shows the regression coefficient regression for the independent (predictor) variables; social self-concept, while the dependent or criterion variable; Biology performance. The result shows r (2,374) = .581, r² = .337. Indicating that approximately 34% of the variance performance can be explained by social self-concept among Biology students in Minna, Nigeria. To determine whether the model was a good predictor, ANOVA result presented in Table 4.11b.

		Sum of		Mean		
Mod	el	Squares	df	Square	Fcal.	P-value
1	Regression	13442.478	1	13442.478	189.901	.000 ^b
	Residual	26403.422	373	70.787		
	Total	39845.900	374			
		- 3				

 Table 4.11b: Regression ANOVA on Social Self-concept and Biology Performance

 among Secondary School Students

b. Predictors: (Constant), SSC

Table 4.11b display ANOVA results. The findings shows that there is a significant relationship between the predictors (social self-concept), and the dependent variable (Biology performance), F(2,374) = 189.9, p(0.00) < 0.05. This indicates that there is a positive relationship between respondents' social self-concept and Biology performance. Hence the null hypothesis stated was rejected. The regression coefficient is presented in the next Table 4.11c

Table 4.11c: Linear Regression Coefficient between Social Self-concept andBiology Performance among Secondary School Students'

		Unstan Coefi	dardized ïcients	Standardize d Coefficients		
Model		В	Std. Error	Beta	Tcal.	P-value.
1	(Constant)	30.239	3.692		8.191	.000
	SSC	.596	.043	.581	13.780	.000

a. Dependent Variable: Performance

Table 4.11c shows the regression coefficient of social self-concept and Biology performance. The result shows social self-concept is a significant predictor of Biology performance (B = .58, t = 13.78, p(0.00 < 0.05). The regression coefficient indicates that for any increase in one unit of social self-concept will cause an increase in 0.581 units of Biology performance (when all other factors are constant) among Biology students in Minna, Nigeria.

HO₃: There is no significant relationship between physical self-concept and Biology performance among secondary school students in Minna

To test this formulated hypothesis, linear regression was used and the analysis is

presented in Table 4.12a

Table 4.12a: Linear Regression on Relationship between Physical Self-concept andBiology Performance among Secondary School Students

Model Summary									
				Std. Error of the					
Model	R	R Square	Adjusted R Square	Estimate					
1	.049 ^a	.002	.000	10.323					
	. ~	~ ~ ~							

a. Predictors: (Constant), PSC

Table 4.12a shows the regression coefficient regression for the independent (predictor) variables; physical self-concept, while the dependent or criterion variable; Biology performance. The result shows r (2,374) = .049, r² = .002. Indicating that 0.2% of the variance performance can be explained by physical self-concept among Biology students in Minna, Nigeria. To determine whether the model was a good predictor, ANOVA result presented in Table 4.12b

 Table 4.12b: Regression ANOVA on Physical Self-concept and Biology

 Performance among Secondary School Students'

		Sum of		Mean		
Mod	el	Squares	df	Square	Fcal.	P-value.
1	Regression	97.336	1	97.336	.913	.340 ^b
	Residual	39748.564	373	106.565		
	Total	39845.900	374			

a. Dependent Variable: Performance

b. Predictors: (Constant), PSC

Table 4.12b display ANOVA results. The findings dependent shows that there is no significant relationship between the predictors (physical self-concept), and the variable (Biology performance), F(2,374) = .913, p(0.34) >0.05. This indicates that there is no

(negative) relationship between respondents' physical self-concept and dependent variable Biology performance. Hence the null hypothesis stated was accepted. The regression coefficient is presented in the next Table 4.12c

Table 4.12c: Linear Regression Coefficient between Physical Self-concept andBiology Performance among Secondary School Students'

		Unstan Coef	dardized ficients	Standardize d Coefficients		
Model		В	Std. Error	Beta	Tcal.	P-value.
1	(Constant)	8.112	2.822		27.683	.000
	PSC	.045	.047	.049	.956	.340

a. Dependent Variable: Performance

Table 4.12c shows the regression coefficient of physical self-concept and Biology performance. The result shows physical self-concept is not a significant predictor of Biology performance (B = .49, t = .96, p(0.34) > 0.05). The regression coefficient indicates that for any increase in one unit of physical self-concept will cause an increase in 34% units of Biology performance (when all other factors are constant) among Biology students in Minna Nigeria.

HO4: There is no significant relationship between academic self-concept, social self-concept, and physical self-concept on Biology performance among secondary school students in Minna

To test this formulated hypothesis, linear regression was used and the analysis is presented in Table 4.13.

Table 4.13a: Linear Regression on the Relationship between Academic,	Social, a	and
Physical Self-concept on Biology Performance		

	Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate						
1	.612 ^a	.375	.369	8.196						
a Predictor	e (Constant)	SSC PSC ASC								

a. Predictors: (Constant), SSC, PSC, ASC

Table4.13a shows the regression coefficient regression for the independent (predictor) variables; academic, social, and physical self-concept, while the dependent or criterion variable; Biology performance. The result shows r (2,238) = .612, r² = .375. Indicating that only approximately 38% of the variance performance can be explained by academic, social, and physical self-concept among Biology students' in Minna, Nigeria. To determine whether the model was a good predictor, ANOVA result presented in Table 4.13b.

 Table 4.13b: Regression ANOVA on Relationship between Academic, Social, and

 Physical Self-concept on Biology Performance

		Sum of				
Mode	1	Squares	Df	Mean Square	Fcal.	P-value.
1	Regression	14922.895	3	4974.298	74.047	.000 ^b
	Residual	24923.005	371	67.178		
	Total	39845.900	374			

a. Dependent Variable: Performance

b. Predictors: (Constant), SSC, PSC, ASC

Table 4.13b display ANOVA results. The findings shows that there is a significant relationship between the predictors (academic, social, and physical self-concept), and the dependent variable (Biology performance), F(2,238) = 74.05, p(0.00) < 0.05. This indicates that there is a positive relationship between respondents' physical self-concept, social self-concept, academic self-concept and Biology performance. Hence the null hypothesis stated was rejected. The regression coefficient is presented in the next Table 4.13c.

		Unstan Coefi	dardized ficients			
Model		В	Std. Error	Beta	Tcal.	P-value.
1	(Constant)	19.654	4.610		4.264	.000
	PSC	004	.038	004	097	.922
	ASC	.230	.049	.214	4.669	.000
	SSC	.501	.047	.488	10.728	.000

 Table 4.13c: Linear Regression Coefficient between Academic, Social, and Physical

 Self-concept on Biology Performance

Table 4.13c shows the regression coefficient of academic, social, and physical selfconcept on Biology performance. The result shows physical self-concept is not a significant predictor of Biology performance (B = -.004, t = -.097, p(0.92) >0.05). The regression coefficient indicates that for any increase in one unit of physical self-concept will cause a decrease in -0.004 units of biology performance (when all other factors are constant) among Biology students in the population. Secondly, The result shows academic self-concept is a significant predictor of Biology performance (B = .214, t = 4.67, p (0.00) <0.05). The regression coefficient indicates that for any increase in one unit of academic self-concept will cause an increase in .230 units of Biology performance. Thirdly, The result shows social self-concept is a significant predictor of Biology performance (B = .488, t = 10.73, p(0.00) <0.05). The regression coefficient of social self-concept on Biology performance indicates that for any increase in one unit of social self-concept will cause an increase in .501 units of Biology performance among Biology student in Minna, Nigeria.

HO₅: There is no significant relationship between gender and secondary school students' academic self-concept in Minna.

To test this formulated hypotheses, point Biserial was used, and the analysis presented in Table 4.14

		Gender	ASC
Gender	rpb Correlation	1	.078
	Sig. (2-tailed)		.130
	Ν	375	375
ASC	rpb Correlation	.078	1
	Sig. (2-tailed)	.130	
	Ν	375	375

 Table 4.14: Relationship between Gender and Students' Academic Self-concept

Table 4.14: revealed there is no significant relationship between students' gender and their academic self-concept. The results show vpb=.078, p-value = (0.130), p> 0.05, the null hypothesis five is accepted. The correlation coefficient (vpb = .078) further shows that there is a positive relationship between gender and academic self-concept. Hence, gender does not have a significant relationship with students' academic self-concept.

4.4 Summary of Findings

- 1. The findings indicated that Biology students in Minna have positive perception about self-concept.
- 2. There was a significant relationship between respondents' academic selfconcept and Biology performance
- 3. There was a significant relationship between respondents' social self-concept and Biology performance.
- 4. There was no significant relationship between respondents' physical selfconcept and Biology performance.
- 5. There was a significant relationship between respondents' physical self-concept, social self-concept, academic self-concept and Biology performance.

6. There was a positive but non-significant relationship between gender and academic self-concept.

4.5 Discussion of Findings

Linear regression was used to determine the strength of the relationship between the dependent variable (physical, social and academic self-concept) and independent variables (Biology performance). The finding shows that the size of the mean difference will probably determine the strength of the relationship. Therefore, it was indicated that the smaller the mean difference the stronger the relationship, but the larger the mean difference the weaker the relationship.

The findings shows that there was a significant relationship between the predictors (academic self-concept), and the dependent variable (Biology performance), F(2,374) = 82.12, p(0.00) < 0.05. Based on this, Hypothesis one which stated that there is no significant relationship between academic self-concept and Biology performance among secondary school students in Minna was rejected. Therefore, academic self-concept is a significant predictor of Biology performance. This result is in line with the findings of Hanan *et al.*, (2016) which indicated that there is a significant relationship between academic self-concept and students' performance among school age children. This also have direct link with the self enhancement model that state that "academic self-concept is a determinant of academic achievement" and the work of Sayid (2011) who, having investigated the relationship between academic self-concept and academic in literature and mathematics performance among high school students, was of the opinion that students' self-concept is a valid predictor of their academic performance.

The findings shows relationship between respondents' social self-concept and Biology performance and social self-concept is a significant predictor of Biology performance (B = .58, t = 13.78, p(0.00) < 0.05) as indicated in table 4.11c. Based on this, Hypothesis two which stated that there is no significant relationship between social self-concept and Biology performance among secondary school students in Minna was rejected. This invariably supports the statement of Laryea (2014) which opined that peer relations are critically important factor in child development, evolution of self-concept, special skill development and establishment of moral and social values. Hecht and Vagi (2012) in their findings also indicated that students with high academic scores have positive interactions with peers.

The regression ANOVA result F(2,374) = .913, p(0.34) > 0.05 indicated there is no relationship between physical self-concept and Biology performance. Based on this, Hypothesis three which states that there is no significant relationship between physical self-concept and Biology performance among secondary school students in Minna was retained. The regression coefficient of physical self-concept and Biology performance result (B = .49, t = .96, p(0.34) >0.05) also shows that physical concept is not a significant predictor of students performance in Biology. This invariably connotes the statement of Haroona *et al.* (2018) which stated that there is no direct relationship between sports participation and academic achievement. Maqbool *et al*, (2020) also have similar results on investigating the impact of physical activity and stress on academic performance of medical students in Rawalpindi university. Their result revealed that association of academic performance and physical activity was not significant with (P-value >0.005).

The regression coefficient result shows r (2,238) = .612, r² = .375, indicating that only 37% of the variance performance in research and academic activities can be explained by academic, social, and physical self-concept among Biology students' in Minna. Based on this, Hypothesis four which stated that there is no significant relationship

between academic self-concept, social self-concept, and physical self-concept on Biology performance among secondary school students in Minna was rejected. Hence, there is a significant relationship between the predictors (academic, social, and physical self-concept), and the dependent variable (Biology performance).

the results as presented showed that xpb=.078, p-value = (0.130), p> 0.05; the correlation coefficient (xpb = .078) is an indication that there is a positive relationship between gender and academic self-concept. Based on this, Hypothesis five which states that there is no significant relationship between gender and secondary school students' academic self-concept was rejected. Hence, gender does not have a significant relationship on students' academic self-concept. This findings differs from the findings of Okafor *et al*, (2020) which revealed that there is a substantial positive relationship among male secondary school students self-concept and their academic achievement in Biology and a low positive relationship between the female student self-concept and their academic achievement in Biology. Maqbool *et al*, (2020) also revealed that gender and academic performance are showing significant association with females being on high achievers' side as compared to males. However, the result agrees with the statement of Bakari *et al*, (2013) that were of the opinion that there is no significance difference in self-concept and academic performance of students in Ghanaian junior high schools' subjects on the basis of gender.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the findings, the study concludes that;

The research has shown positive correlation between Self-Concept (Academic selfconcept, Social self-concept and Physical self-concept) and Biology performance among secondary school students in Minna. Hence, as Self-Concept increases the Biology performance among secondary school students in Minna also increases.

Also, there was positive perception about Self-Concept among Biology secondary school students in Minna. Hence, as student's self-concept perception increases Biology students performances also increase.

5.2 Recommendations

- School administrators should seek means of general improvement like extracurriculum activities in respect to student perception and also their self-concept. Also, Biology teachers could discuss positive learning experiences among the students so as to boost their perception towards academic achievement especially in Biology.
- 2. There was a relationship between respondent academic self-concept and Biology performance hence, workshop could be organized to educate student on the benefits of academic self-concept toward Biology performance.
- 3. Biology teachers should use teaching method like discussion, grouping, interaction among students to help boost their social self-concept.

- 4. School administrators should review and motivate schools in participating in extracurriculum activities like sport and others activities to help improve their physical self-concept.
- 5. Biology teachers in collaboration with school administrators can design various mechanisms like positive self-talk show, guidance and counseling, interaction class to bring about physical, social and academic self-concept of students toward Biology performance. Also, parents, teachers and stakeholders could serve as counselors and guidance to improve students' performance and build their selfconcept.
- 6. Cross idea, group assignment in the classroom could be encouraged by class teacher for better performance of Biology students. Also, Biology teachers should adopt classroom instructional activities that can enhance male and female students' self-concept so as to boost their academic achievement in Biology.

5.3 Contribution to Knowledge

The result of this study have greatly contributed to the body of knowledge in the following ways;

- The study has provided knowledge on the relationship between the Self-Concept (Academic Self-Concept, Social Self-Concept and Physical Self-Concept) and Biology performance of secondary school students to be positive.
- 2. It has provided that Biology students in Minna have positive perception about selfconcept, and
- 3. It has also contributed to existing literatures and provided a platform for researchers on relationship between the three predictors/correlates of self-concept and Biology performance among secondary school students.
5.4 Suggestions for Further Study

- 1. The study could be replicated using an experimental research design to compare the results.
- 2. Other independent variable (criterion) could be further research into so as to understand other characteristics that influence students' performance.
- 3. Future researcher could replicate the study in another location apart from Niger state.
- 4. Teachers' factor, teaching facilities and learning environment could be investigated to determine students' performance in Biology.

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APPENDICES

APPENDIX A

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Case Processing Summary

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Cases	Excluded ^a	0	.0		
	Total	249	100.0		
a. Listwise deletion based on all					

variables in the procedure.

Reliability Statistics

Cronbach's	Ν	of
Alpha	Items	
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SOCIA SEF CPNCEPT

RELIABILITY

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RELIABILITY

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Reliability

Notes

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	Definition of Missing	treated as missing.
Missing Value Handling		Statistics are based on all cases with
	Cases Used	valid data for all variables in the
		procedure.
		RELIABILITY
		/VARIABLES=SSC1 SSC2 SSC3
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Syntax		SSC9 SSC10
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Scale: ALL VARIABLES

Case Processing Summary

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Cases	Excluded ^a	0	.0
	Total	249	100.0

a. Listwise deletion based on all variables in

the procedure.

Reliability Statistics

Cronbach's	N of Items
Alpha	
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PHYSICAL SELF-CONCEPT

RELIABILITY

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Case Processing Summary

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Cases	Excluded ^a	0	.0
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Reliability Statistics

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Alpha	Items	
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APPENDIX B

QUESTIONAIRE ON SELF-CONCEPTS

(QSC)

Dear Respondent,

I am Shopelu Bolanle (M.Tech/SSTE/2018/8135) an M.Tech(Postgraduate student) of Federal University of Technology, Minna is undertaking a research on Secondary School Student Self Concept as Predictor of Performance in Biology. You are kindly requested to sincerely respond to the items on the questionnaire. The data obtained will be used strictly for the purpose of this research.

Thank you.

Section A: Demographic data

In this section, you are expected to provide information about yourself.

Name of student:

Class : _____

1.Gender :Male Female	
2. Age Bracket : Less than 15^{-18} ; $15-18^{-18}$, 15 and above	
3. School Location: Rural Urban	
4. Last Term Score in Biology	

Section B : Academic Self Concept

Please indicate your opinion by ticking any of the following as applicable to you. Strongly Agree (SA) Agree (A)Disagree (D) Strongly Disagree (SD).

S/N	ITEMS	SA	Α	D	SD
1	I always have good grades in Biology				
2	I have no issues with spelling biological				
	/botanical words				
3	I enjoy studying Biology				
4	I am good in drawing and labeling Biology				
	diagrams				
5	I have no problems pronouncing biological				
	words				
6	Learning Biology enhances my understanding				
	of other science subjects				
7	I do better in Biology than other subjects				
8	Biology is relevant to my daily life activities				
9	Biology is not boring to me at all				
10	I have interest in Biology				

Section C: Social Self Concept

S/N	ITEMS	SA	Α	D	SD
1	I find it interesting discussing Biology with				
	my parents				
2	I make friends easily as an individual				
3	I am loved by everybody				
4	I have many friends among my classmates				
5	I get along easily with those older than me				
6	It's pleasure to be around friends				
7	I get along very well with opposite sex				
8	I have no problem getting along with my class				
	mates				
9	I learn better during peer tutoring in school				
10	I love sharing ideas with my classmates				

S/N	ITEMS	SA	Α	D	SD
1	I am very attractive				
2	I am handsome/beautiful				
3	I am well organized				
4	I have a good physical structure				
5	I have a good height				
6	I look better than my friends				
7	I am very strong				
8	I always look smart				
9	I enjoy sports and physical activities				
10	I like to exercise vigorously at sports				

Section D Physical Self Concept





SOURCES: DEPARTMENT OF TRANSPORT

APPENDIX D

NIGER STATE MINISTRY OF EDUCATION SCIENCE AND TECHNOLOGY MINNA RECORDS OF STUDENTS PREFORMANCE IN BIOLOGY, WAEC MAY/JUNE EXAMINTIONS (2012-2017)

YEAR	NAME OF SCHOOL	NUMBER OF CANDIDATES RESIGSTERED	NO OF CREDIT	NO OF PASS	NO OF FAIL	PRECENTAGE OF CREDIT	PRECENTAGE OF PASS	PRECE NTAGE OF FAIL
2012	BOSSO SECONDARY SCHOOL	118		1	117		1%	99%
	DSS MAIKUNKELE	101	2	8	91	2%	8%	90%
	MBGSC MINNA	357	22	210	125	6%	59%	35%
	CAIS S.M.S T/F MINNA	28			28	0%	0%	100%
	GIRLS DAY BOSSO ROAD MINNA	240		86	154	0%	36%	64%
	ARMY DAY SEC, SCHOOL 'A'	247	9	28	210	4%	11%	85%
	WOMAN DAY MINNA	132	1	18	113	1%	14%	86%
	ZARUMAI MODEL SCHOOL MINNA	324	77	167	80	24%	52%	25%
	ABSS MINNA	185	2	56	127	1%	30%	69%
	GSS 'A'	215	22	70	123	10%	33%	57%
2013								
	DAY SEC SCH SHAKWATU	182		44	138	0%	24%	76%
	DSS MAIKUKELE	202		17	185	0%	8%	92%
	DAY SEC SCH BEJI	167	1	18	148	1%	11%	89%
	GIRLS DAY BOSSO ROAD MINNA	204	2	22	180	1%	11%	89%
	HILL TOP MODEL SCHOOL	296	16	67	213	5%	23%	72%
	ABSS MINNA	306	12	78	216	4%	25%	71%
	ZARUMAI MODEL SCHOOL MINNA	178			178	0%	0%	100%
	CAIS S.M.S T/F MINNA	89		1	88	0%	1%	99%
	DAY SEC. SCHL CHANCHANGA	146	8	82	56	5%	56%	38%
	BOSSO SEC SCHL	118		1	117		1%	99%
	ARMY DAY SEC SCHL	247	9	28	210	4%	11%	85%

2014								
	DAY SEC SCHL	240	1	45	196	0%	19%	82%
	CHACHANGA		-			• / •	- / / •	
	DAV SEC SCHI	222		7	215	0%	30%	07%
	MAITUMDI			/	215	070	570	9170
		107	50	101	20	210/	5 40/	1.60/
	HILL IOP	18/	58	101	30	31%	54%	16%
	MODEL							
	ABSS MINNA	194		14	180	0%	7%	93%
	GDSS MINNA	51		4	47	0%	8%	92%
	GOVERNMENT	60		3	57	0%	5%	95%
	DAY SEC SCHL							
	MINNA							
	DAY SEC SCHI	327	58	106	163	18%	32%	90%
	BEII	521	50	100	105	10/0	5270	2070
		11		4	7	00/	260/	640/
		11		4	/	0%	30%	04%
	MINNA		-				-	
	ZARUMAI	146	8	82	56	5%	56%	38%
	MODEL SCHL							
	GIRLS DAY	59			59	0%	0%	100%
	SCI. COLLEGE							
2015								
	ZARUMAI	168		3	165	0%	2%	98%
	MODEL SCHI	100		5	105	070	270	2070
	MINNA							
		125	10	40	02	70/	210/	C10/
	ABSS MIINNA	155	10	42	83	7%	31%	01%
	GGSS	76		2	74	0%	3%	97%
	MINNA'A'							
	GOVERNMENT	47	11	22	14	23%	47%	30%
	SEC SCHL							
	MINNA							
	DAY SEC SCHL	82		1	81	0%	1%	99%
	CHANCHAGA	-			-			
	BOSSO SEC	33		2	31	0%	6%	94%
	SCHI MINNA	55		2	51	070	070	7470
	DAV SEC SCHI	05	14	66	15	150/	600/	160/
	DAT SEC SUIL	93	14	00	15	13%	09%	10%
	MAITUMBI		-					
	CAIS S.M.S T/F	24	9	14	1	38%	58%	4%
	MINNA							
	DSS	61		5	56	0%	8%	92%
	GBADA(G/MAN							
	GORO)							
	GIRLS DAY	61	21	38	2	34%	62%	3%
	SCI. COLLEGE							
	GOVERNMENT	74	26	29	19	35%	39%	26%
	DAV SEC SCUI	/ F	20	27	17	5570	5770	2070
	MINNA							
		51		4	47	00/	Q0/	020/
		51		4	47	U%	ð%	92%
	MINNA	 					1 -	
	DAY SEC SCHL	47	11	22	14	23%	47%	30%
	GARATU							
2016								
	ABSS MINNA	104	48	53	3	46%	51%	3%
	'A'							
	ABSS MINNA	105	5	39	61	5%	37%	58%
	'B'	100	5	57	01	570	5170	5070
		202	11	56	125	50/	280/	670/
	LAKUMAI	202	11	30	135	J %0	20%	0/%
	MODEL SCHL							
	MINNA							
	GOV. DAY SEC.	35		2	33	0%	6%	94%

	SCHL MINNA							
	GOV.	82	75	4	3	91%	5%	4%
	TECHNICAL							
	C0LL.T/GORO							
	COLLEGE OF	85	1	3	81	1%	4%	95%
	ART &							
	ISLAMIC SCHL							
	DAY SEC SCHL	54	13	18	23	24%	33%	43%
	MAITUMBI							
	GIRLS DAY	45		17	28	0%	38%	62%
	SCI. COLLEGE							
2017								
	GGSS MINNA 'A'	110		88	22	0%	80%	20%
	GGSS MINNA	36			36	0%	0%	100%
	'B'	50			50	070	070	10070
	ZARUMAI	278	16	83	179	6%	30%	64%
	MODEL SCHL							
	MINNA							
	DAY SEC SCHL	74	26	29	19	35%	39%	26%
	LIMAWA							
	ABSS MINNA	95	14	66	15	15%	69%	16%
	HILL TOP	54	13	18	23	24%	33%	43%
	MODEL							
	WOMAN DAY	45		16	27	2%	37%	63%
	MINNA							
	BOSSO SEC	54	13	18	23	24%	33%	43%
	SCHL MINNA							
	ARMY DAY	61	21	38	2	34%	62%	3%
	SEC SCHL							
	DSS	85	1	3	81	1%	4%	95%
	MAIKUKELE							
]	



APPENDIX E

APPENDIX F



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