

**PSYCHOLOGICAL VARIABLES AS CORRELATES OF BIOLOGY
STUDENTS' ACADEMIC ACHIEVEMENT IN UYO LOCAL
GOVERNMENT AREA,
AKWA IBOM STATE**

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Abstract

Low academic achievers in Biology are always discussed to manifest more of psychological problems. Over the past years, this issue has been a source of worry to parents and biology educators. Thus, this study is an empirical examination of psychological variables as correlates of biology students' academic achievement in Uyo Local Government Area, Akwa Ibom State. In line with the objectives of the study, three research questions were raised to guided the study and three null hypotheses were tested at 0.05 level of significance. Correlational research design was used for the study. The target population for the study consisted of 954 senior secondary two (SSII) students offering biology in all the 14 public secondary schools in Uyo Local Government Area. Simple random sampling technique was used to select 8 public secondary schools from the population. Taro Yamane's sample size statistics was used to determine a sample size of 320 senior secondary two (SSII) biology students. Biology Attitude Scale Questionnaire (BASQ), Biology Self-Concept Scale Questionnaire (BSSQ), Biology Study Habit Scale Questionnaire (BSSQ) and Terminal Continuous Assessment Result (TCAR) were used as the instruments for data collection. The reliability coefficients of BASQ, BSSQ and BSSQ was 0.80 respectively. Pearson Product Moment Correlation was used for data analysis. The results of the analyses showed that; there is significant positive low correlation between students' attitude, self-concept and study habit and their academic achievement in biology. It was concluded from the study that; attitude, self-concept and study habit are the key psychological variables that correlate students' academic achievement in biology. It was recommended among othersthat, students

should cultivate the right study habits and attitudes to learning as well as having self-confidence in order to achieve academic success in biology.

Keywords: Psychological Variables, Attitude, Self-Concept, Study Habit, Academic Achievement

1 Introduction

Biology is the science of life. It is a branch of natural science that deals with the study of living organisms, their structures, functions, evolution, distribution and interrelationships. Biology occupies a unique position in the secondary school education curriculum because of its importance as science of life. Biology is the study of living organisms utilizing the scientific method. It classifies and describes organisms, their functions, how species come into existence, and the interactions they have with each other and with the natural environment. The four unifying principles forming the foundation of modern biology are cell theory, evolution, genetics and homeostasis. Biology is a science subject which aims at equipping students with appropriate scientific attitude, competences and ability to apply scientific knowledge to every challenge of life. Biology as a science subject occupies a central position in the science curriculum (Federal Republic of Nigeria, FRN, 2014). This is because Biology as a life science subject concerned with the study of living organisms with regards to their structure, function, growth, evolution, distribution, identification and taxonomy. Umaru (2011) explained that the study of biology enables man to understand the diversity of life forms, conservation and sustainable use of natural resources.

According to Umaru (2011), biology is a natural science that deals with living world; how the world is structured, how it functions and what these functions are, how it develops, how living things came into existence, and how they interact with one another and with their environment. Okori and Jerry (2017) as well as Ahmed and Abimbola (2011) reported that biology is a perquisite subject for many fields of learning that contributes immensely to the technological growth of the nation. These include medicine, pharmacy, nursing, agriculture, forestry, biotechnology, brewery, environmental sciences and geology among others. Biology has contributed to the growth and development of new and better drugs and vaccines against many human and animal diseases and has also contributed towards the conservation of the environment and endangered species (Institute of Biology, 2013). In addition, the basic knowledge and skills acquired from the subject can be of tremendous help to man and the society (Umoruand Onoja, 2017). The impact of biology on the life of living organisms is wide; all ensuring that the required standard of living for both plants and animals are maintained (Ugwaduand Joda, 2015). There is no doubt about the immense contribution of biology to the economic growth and development of a nation. The benefits of biology for the development of any nation are too numerous to mention, and this is because biology plays a key role in industrialization and other sectors of the economy.

Most biological sciences are specialized disciplines which are grouped by the type of organism being studied - botany, the study of plants; animal and environmental biology, the study of animals and the ecology; and microbiology, the study of microorganisms. The fields within biology are further divided based on the scale at which organisms are studied and the methods used to study them. For instance, biochemistry examines the fundamental chemistry of life; molecular biology studies the complex interactions of systems of biological molecules; cellular biology examines the basic building block of all life (the cell); physiology examines the physical and chemical functions of the tissues and organ systems of an organism; while ecology examines how various living organisms interrelate. Applied fields of biology such as medicine and genetic research involve many specialized sub-disciplines. A central organizing concept in biology is that life changes and develops through evolution and that all life forms known have a common origin. Biological form and function are created from and is passed on to the next generation by genes, which are the primary units of inheritance. Biology plays an important role in the life of an individual (Institute of Biology, 2013).

Maduabum (2009) highlighted the importance of biology to include: helping individuals to understand the parts of his or her body and their functions; enabling one to question superstition due to sustained interest arising from comprehension of the cause of events; understanding and appreciating life; bringing into focus the need to maintain good health; promoting the individual for choice of careers; inculcating in the individual scientific skills and attitudes in his approach to personal and societal problem; imparting factual knowledge and stimulate scientific reflective thinking so as to produce a better informed individual. Due to the importance of biology, much emphasis has been placed on instructional delivery especially at the secondary school level. This is to assist in memorization of principles and objectives of biology education as stipulated by the National Policy on Education (Federal Ministry of Education, 2013). The study of biology in senior secondary schools is expected to equip students with useful concepts, principles and theories that will enable them face the challenges before and after graduation. In spite of the importance of biology, Nigerian students' academic achievement in biology at senior secondary level over the years has been poor (Egbedi, 2016) and fluctuating in downward motion.

Academic achievement of students in biology in public examinations organized by external examine bodies such as West African Examination Council (WAEC), National Examination Council (NECO) and Joint Admissions Matriculation Board (JAMB) in Nigeria has been consistently poor, and students' persistent poor achievement has been worrisome in recent years. The sound system of secondary education bequeathed to us by the British is no longer what it was due to bad leadership, corruption, frequent change of policy and poor planning as well as the poor attitudes of students, the teachers and the parents (Onah, 2017). Today, it has become increasingly difficult to match content with practice, leading to gradual but steady increase in failure rates of the secondary school students in public

examinations. It is even becoming more worrisome as more emphasis is on certifications than the know-how.

Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environment (Stainmayr, Meibner, Weidinger and Wirthwein 2014). It refers to the level of schooling one has successfully completed and the ability to attain success in one's studies. Academic achievement is the extent to which students, teachers or institutions have achieved their short, medium or long-term educational goals. Success in senior secondary school examination or any other level of examination is a symbol of academic achievement. Basically, what constitute academic achievement according to Nwagbo (2013), is the learning outcomes which has to do with knowledge attained from teaching process, which are commonly measured by examination or continuous assessment. Academic achievement encompasses all academic exercises in the class, level of retention, punctuality to lesson, level of students' concentration to lesson, and interest as well as academic achievements (Jekayinfa, 2012). Academic achievement refers to how an individual is able to demonstrate his or her intellectual abilities (Opara and Nwaukwu, 2016).

Amasuomo (2014) declared that academic achievement is characterized by performance on tests associated with course work and the performance of students on other types of examinations. The poor performance of the candidates in public examinations reflects the level of failure at the senior secondary schools. A number of factors have been identified as the causative factors responsible for the poor performance in examinations. These factors according to Uduh (2010) include but not limited to: student's inadequate preparation and poor coverage of the syllabus; failure on the part of students to adhere to instructions; lack of understanding of the demands of the question which is due to poor reading culture; illegible handwriting and poor spellings; shortage of qualified teachers; inadequate facilities; lack of good school environment; and examination malpractices among others. Many educational stakeholders have put the blame of students' failures in WAEC or NECO examinations on the students and the examination bodies while some blamed parents and the society as a whole while other researchers faulted the teachers, government, educational stakeholders and institutions (Egbedi, 2016; Onah, 2017).

Arong and Ogbadu (2010) highlighted the major causes of declining academic achievement in Nigeria to include lack of adequate qualified teachers, students' attitude to study, parental irresponsibility, misplaced government priorities, corruption or lack of integrity among some educational stakeholders. Others are lack of adequate educational inspection and school supervision. Other factors as grouped by researchers that influence academic achievement are environmental factors like war, insurgency, political instability, community conflicts, migration, herdsmen attacks, militancy, insecurity (Iwuagwu, 2016); administrative variables like corruption, lack of integrity among some educational stakeholders, government

misplaced interest in education investment/funding, poor educational policies/politicizing, privatization of basic education, under staffing in many subjects, educational infrastructure, poor library facilities (Arongand Ogbadu, 2010; Daworiye, Alagoa, Enaregha and Eremasi, 2015; Ikgbusiand Iheanacho, 2016). Another major cause of declining academic achievement in Nigeria includes demographic variables.

Demographic variables like gender disparity, parental background/involvement, age, family resources, income, status, location, tribe, colour, qualifications and experience of teachers among others have been identified (Ige, 2011; Keller, 2012; Ogbaand Igu, 2014). Institutional factors or school variables like broad syllabus, work load for teachers, poor infrastructural facilities, lack of learning facilities, introduction of new subjects without qualified teachers, large class size/high student-teacher-ratio, teacher interest and commitment, school calendar instability, teaching method, school leadership, school plant among others (Adeyemiand Adeyemi, 2014). Sociological variables include study habit, gender disparity, learning ability, self-concept, motivation, peer group, culture interest, emotional and social factors, attendance, attention in class, seating choice (Osarenren, 2013; Wachikwu, Kevwe and Eseose, 2017). Furthermore, the cause of declining academic achievement of students in biology can also be attributed to factors such as psychological variables.

Students' poor academic achievement in biology in Senior Secondary School Examinations (SSCE) over the past years has been a source of worry to parents and biology educators. Students have been observed to be manifesting certain psychological problems in senior secondary schools. Studies have also shown that low achievers are more likely to manifest psychological problems. The observed psychological problems affecting students' academic achievement are poor attitude to studies, low self-concept and poor study habit among others. Moreso, it has been observed that past researches have been carried out on instructional strategies on students' academic achievement in schools without a commensurate attention on psychological problems. Consequently, the present study deems it necessary to examine the correlates of psychological variables on secondary school students' academic achievement in biology in Uyo Local Government Area, Akwa Ibom State.

The purpose of the study is to find out the psychological variablesas correlates of secondary students' academic achievement in biology in Uyo Local Government Area of Akwa Ibom State. Specifically, this study sought to:

1. examine the correlation between students' attitude and academic achievement in biology.
2. determine the correlation between students' self-concept and academic achievement in biology.
3. examine the correlation between students' study habit and academic achievement in biology.

The following research questions therefore emanates from the above objectives:

1. What is the correlation between students' attitude and academic achievement in biology?
2. What is the correlation between students' self-concept and academic achievement in biology?
3. What is the correlation between students' study habit and academic achievement in biology?

The following null hypotheses will be tested:

1. There is no significant correlation between students' attitude and academic achievement in biology.
2. There is no significant correlation between students' self-concept and academic achievement in biology.
3. There is no significant correlation between students' study habit and academic achievement in biology.

2 REVIEW OF RELATED LITERATURE

Psychological variables are those factors that relate with people's thoughts, feelings, and behaviours as influenced by the actual, imagined, or implied presence of others (Kruglanski and Stroebe, 2011). Psychological variables are concern with the way feelings, thought, beliefs, intentions and goals are cognitively constructed and how these mental representations in turn influence the interactions with others. Some of the important psychological variables are perception, motivation, personal relevance, feelings, frustration, aptitude, examination anxiety, mental health, natural ability, attitude, self-concept, intelligence and study habit among others. Researchers have shown that the behaviour of students especially in biology are greatly influenced by certain psychological factors and that some of these factors can significantly improves or impede students' academic achievement (Eduwem, Umoinyang and Otu, 2017). However, the psychological variables consider for this study are attitude, self-concept and study habit.

Attitude is defined as inclinations and predispositions that guide an individual's behaviour and persuade to an action (Adodo and Gbore, 2012). Attitude is an established way of thinking or feeling or behaving about something or someone. It is a predisposition or a tendency to respond towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and responses to challenges, incentives and rewards. A person having right attitude towards any situation achieve their goal easily, hence, the development or formation of right attitude in one's life is helpful in facing any academic challenge (Das, Halder, Mishra and Debnath, 2014). Daset *al.*, (2014) found a significant influence of students' attitude on their academic achievement. Adekunle and Femi-Adeoye (2016)

affirmed that there is a significant relationship between the students' attitude to biology and students' academic achievement in biology. Therefore, the kind of attitude and self-concept a student holds in learning biology is of great significance to the student academic achievement.

Self-concept is the collection of beliefs about oneself that includes elements, such as academic achievement, gender roles, sexuality, and racial identify. Generally, self-concept embodies the answer to "Who am I?" Self-concept is generally defined as an individual perception based on self-knowledge or experience and formed through interaction with environment and attributes of the individual behaviour (Jaiswal and Choudhuri, 2017). Studies have showed that for achieving more in biology, it beginning with a right self-concept. Students with a right self-concept tend to reflect socially acceptable behaviours toward biology whereas students with a wrong self-concept tend to reflect non-socially and unacceptable behaviours toward biology. Ghazvini (2011) opined that self-concept closely correlates the measures of students' academic achievement of high school in Iran. Jaiswal and Choudhuri (2017) stated that there is a relationship between academic self-concept and academic achievement of secondary school students. Another variable that directly relate to academic achievement study habit.

Study habits are learning tendencies that enable students to work privately. The term study habit can be as the students' way of study whether systematic, efficient or inefficient. Literally, it means that efficient study habit produces good academic achievement while inefficient study habit leads to academic failure. Study habit are measured directly through reports, examination, assessment and rating. Students' study habit towards any subject has been described as a function of their belief about the subject and implicit evaluative responses with those beliefs, all of which has direct relationship with the student academic achievement. A great deal of research studies opined that study habit plays an important role in the academic achievement of students and is closely associated with their success in examination (Siddiqui and Ali, 2018). Ayodele and Adebisi (2013) reported that study habit as one of the psychological variables can produce good academic achievement when it is adequately utilized.

Studies have shown that sociological and psychological variables play a significant role in student academic achievement, if other variables remain constant (Osarenren, 2013). Several literatures have shown that low academic achievers are more likely to face sociological and psychological problems which include; peer group influence, poor parental involvement, learning inability, poor attitude to study, gender disparity/inequality, poor motivation and poor study habit (Egbedi 2016; Wachikwu, *et al.*, 2017) whereas Babajida (2018), found negligible or no significant influence of sociological and psychosocial factors on academic achievement. From the aforementioned factors influencing students' academic achievement, many researchers have carried out investigations in combination with environmental

factors, administrative variables, demographic variables, institutional factors or school variables or sociological and psychological variables on students or teachers among others, resulting in mixed results (either a positive, negative or insignificant influence).

Empirical studies have shown that psychological variables play a significant role in students' academic achievement, if other variables remain constant (Osarenren, 2013). Several literatures have shown that low academic achievers are more likely to face psychological problems which include; learning inability, poor attitude to study, gender disparity/inequality, poor motivation and poor study habit (Wachikwuet *al.*, 2017) whereas Babajida (2018) found negligible or no significant influence of psychological factors on academic achievement. From the aforementioned factors influencing students' academic achievement, many researchers have carried out investigations in combination with environmental factors, administrative variables, demographic variables, institutional factors or school variables or psychological variables on students or teachers among others, resulting in mixed results (either a positive, negative or insignificant influence). It is therefore important to see psychological variables (attitude, self-concept and study habit) would have relationship on biology students' academic achievement. This study intends to find out the correlates of psychological variables on secondary school students' academic achievement in biology. There are some theories believe to thrust and model students' academic achievement, such include; Social Cognitive Theory.

Social Cognitive Theory was propounded by Albert Bandura in 1977. The theory posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behaviour. That is, when people observe a model performing or behaving and the consequences of that behaviour, the people remember the sequence of events and use this information to guide subsequent behaviour. It is a learning theory based on the idea that people learn by observing others or the environment. According to Bandura, the entire three elements: the person, the environment and the behaviour are highly interrelated variables each being capable of influencing the other. The unique feature of social learning theory is the emphasis on social influence and its emphasis on external and internal social reinforcement. Social learning theory considers the unique way in which individuals acquire and maintain behaviour, while also considering the social environment in which individuals perform the behaviour.

Bandura social cognitive theory takes into account a person's past experience, which factor into whether behavioral action will occur. The social learning theory emphasizes the importance of observing and imitating the behaviour, attitudes and emotional reactions of others. Thus, it focuses on learning by observation and imitation. Imitation and modeling of influential persons or models also depend on reinforcement. This reinforcement can either be direct or vicarious in direct reinforcement, the person imitating the model receives reinforcement directly. When

a child, for instance is praised for exhibiting behaviour, the child receives direct reinforcement. Relating it to the present study, students can model after their peers who have positive attitudes and behaviour towards biology, in order to enhance their academic achievement in biology. This theory is therefore relevant to this study in the sense that, it will help students to learn the characteristics of behaviour that make up their personality through observation and imitation. Social Cognitive Theory is also relevant in this study to assist students in career choice and institutional behaviour as well as in understanding classroom motivation, learning, and academic achievement. Humanistic Theory of Personality is another theory deployed in the study.

Humanistic theory of personality was founded by Carl Rogers in 1951. Humanistic theory of personality emphasises the importance of the self-actualising tendency in forming or shaping a self-concept. Rogers believed that all behaviour is motivated by self-actualizing tendencies, which drive a person to achieve at their highest level. As a result of their interactions with the environment and others, an individual forms a structure of the self or self-concept - an organized, fluid, conceptual pattern of concepts and values related to the self. If a person has a positive self-concept, they tend to feel good about who they are and often see the world as a safe and positive place. If they have a negative self-concept, they may feel unhappy with who they are. Rogers further divided the self into two categories: the ideal self and the real self. The ideal self is the person that you would like to be; the real self is the person you actually are. Rogers focused on the idea that people need to achieve consistency between these two selves. People experience congruence when our thoughts about our real self and ideal self are very similar - in other words, when our self-concept is accurate. High congruence leads to a greater sense of self-worth and a healthy, productive life. Conversely, when there is a great discrepancy between person's ideal and actual self, the person experienced a state Rogers called incongruence, which can lead to maladjustment. Rogers added that self-concept involves an organized pattern of thought and perception about one self.

This theory is relevant to this work because if the learner understands self-worth and the person is sound, learning would easily take place leading to high academic achievement. A high congruence of the learner which leads to high academic achievement in school to a great extent may be determined by the sociological factors and psychological factors which are the main independent variables for the study. Humanistic theory of personality helps in discovering the conditions under which a person can fully develop potentialities. The entire theory is built on a single force of life (self-actualising tendency), thus, disclosing that every person has the achievement tendency in their endeavour. Attribution Theory was also deployed to study students' academic achievement.

Attribution Theory was first propounded by Fritz Heider in [1958](#). This theoretical framework has become a major research paradigm of social psychology. Attribution

theory is concerned with how individuals interpret events and how this relates to their thinking and behaviour. Attribution theory assumes that people try to determine why people do what they do, that is, attribute causes to behaviour. A person seeking to understand why another person did something may attribute one or more causes to that behaviour. A three-stage process underlies an attribution: (1) the person must perceive or observe the behaviour, (2) then the person must believe that the behaviour was intentionally performed, and (3) then the person must determine if they believe the other person was forced to perform the behaviour (in which case the cause is attributed to the situation) or not (in which case the cause is attributed to the other person). The author focused his attribution theory on achievement and identified ability, effort, task, difficulty, and luck as the most important factors affecting attributions for achievement. Attributions are classified along three causal dimensions: locus of control, stability, and controllability. The locus of control dimension has two poles: internal versus external locus of control. The stability dimension captures whether causes change over time or not. For instance, ability can be classified as a stable, internal cause, and effort classified as unstable and internal. Controllability contrasts causes one can control, such as skill/efficacy, from causes one cannot control, such as aptitude, mood, others' actions, and luck. Attribution theory is closely associated with self-concept and achievement.

The relevance of attribution theory is that it motivates a student to perform more by giving reasons for such behaviour. Through theory of achievement attribution, we make causal attributions for success or failure on a task according to whether the locus of the cause is internal or external. The application of attribution theory to education can help motivate children and improve their achievement after failure by addressing their attributional styles. Furthermore, re-attributional training has also been shown to be effective in reducing hyperactivity and improving the learning of children with ADHD. Similarly, children who have behaviour problems have been shown to have 'depressed' attributional styles, which may be altered if teachers reward self-enhancing attributions. Indeed, awareness of attributional styles in teachers would be highly beneficial and would prevent their attributions for children's behaviour from negatively impacting on children's attributions. Attribution theory may also help to improve collaboration between the parents of children with learning difficulties and educational psychologists and teachers.

Attribution theory can be used to explain the difference in self-concept between high and low achievers. From the implication of attribution theory, high achievers will approach rather than avoid tasks related to succeeding because they believe success is due to high ability and effort which they are confident of. Failure is thought to be caused by bad luck or a poor examination, that is, not their fault. Thus, failure doesn't affect their self-esteem but success builds pride and confidence. On the other hand, low achievers avoid success-related chores because they tend to (a) doubt their ability and/or (b) assume success is related to luck or to "who you know" or to other factors beyond their control. Thus, even when successful, it isn't as rewarding to the

low achiever because the person does not feel responsible, that is, it does not increase the person pride and confidence.

3 METHODOLOGY

Correlational research design was used in the study. Correlational design was used because it helps to investigate the correlation between dependent and independent variables. This design was used to find out if there is any correlation between students' attitude, students' self-concept and students' study habit as it relates to their academic achievement in biology.

The study was conducted in public secondary schools in Uyo Local Government Area, Akwa Ibom State. The population of the study comprises of all the 954 senior secondary two (SSII) students offering biology in all the 14 public secondary schools in Uyo Local Government Area of Akwa Ibom State (State Secondary Education Board, Uyo, 2021).

The sample size of three hundred and twenty (320) was determined using Taro Yamane's sample size formula at error term of 0.04561 (4.561%). Eight (8) schools were randomly selected from the 14 public secondary schools in Uyo Local Government Area of Akwa Ibom State. Forty (40) students in SSII offering biology in each of the eight secondary schools were also randomly selected giving a total of three hundred and twenty (320) students for the study. The choice of this sampling technique was borne out of the reasons that each student in the population has equal chance of being selected, no bias in the selection and entirely on merit of the member not as determined by another member.

Three instruments were used for data collection 'Biology Attitude Scale Questionnaire (BASQ), Biology Self-Concept Scale Questionnaire (BSSQ), Biology Study Habit Scale Questionnaire (BSSQ) and Terminal Continuous Assessment Result (TCAR). BASQ, BSSQ and BSSQ was a standardized instrument with ten items in each of the variable making a total of twenty items. The Terminal Continuous Assessment Result (TCAR) was SSII biology students' third term examination scores in each of the school sampled for the study. BASQ, BSSQ and BSSQ was on four-point Likert scale response options ranging from strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD). The BASQ, BSSQ and BSSQ consisted of five subsections which focus on attitude, self-concept and study habits it relates to their academic achievement in biology. The items in the questionnaire were sorted out according to the variables they were design to measure. The independent variables were stated on the positive key with each subsection having 10 items making a total of twenty (20) items and was scored from strongly agree (4), agree (3), disagree (2) and strongly disagree (1).

The draft of the research instruments 'Biology Attitude Scale Questionnaire (BASQ), Biology Self-Concept Scale Questionnaire (BSSQ) and Biology Study Habit Scale

Questionnaire (BSSQ) were given to a professor in biology education and a lecturer in the department of educational foundation, measurement and evaluation, University of Uyo. These experts, through non-experimental method were made to validate the instrument based on syllabus adequacy. In order to establish the reliability of the instruments, a test-retest reliability procedure was used. Biology Attitude Scale Questionnaire (BASQ), Biology Self-Concept Scale Questionnaire (BSSQ), Biology Study Habit Scale Questionnaire (BSSQ) were administered to a sample of 40 SSII biology students. Simple random sampling technique was used to draw a sample of 40 SSII biology students who do not form part of the main sample for the study. After an interval of two weeks, the same instruments were administered to the same students and their responses were scored. The initial and re-tested scores were correlated using Pearson's Product Moment Correction. The reliability coefficient for the Biology Attitude Scale Questionnaire (BASQ), Biology Self-Concept Scale Questionnaire (BSSQ) and Biology Study Habit Scale Questionnaire (BSSQ) was 0.80 (0.72 for attitude, 0.72 for self-concept and 0.86 for study habits). This is considered to be a high reliability coefficient (Michael, 2010); thus, the instrument was considered suitable to be used in conducting the study.

Research Procedure

The questionnaire was administered personally by the researcher with the help of research assistants. The students were given 40 minutes to respond to the questionnaire. The study recorded 100 percent return rate of the questionnaire. The independent variables' (attitude, self-concept and study-habits) scores were obtained from the students' responses on the two aforementioned subject matters respectively while the dependent variable (students' academic achievement) scores in biology were obtained from the Terminal Continuous Assessment Results (TCAR) for SSII biology students of the school sampled for the study.

The statistical method used for data analysis was Pearson Product Moment Correlation (PPMC) to find the correlation that exist between the dependent variable and independent variables. Mean and standard deviation was used for the item-by-item analysis at 0.05 level of significance. The interpretation of the correlation results (r_{cal}) of the study was as follows:

± 0.00 to ± 0.20	=	Negligible, weak or none correlation
± 0.21 to ± 0.40	=	Low correlation
± 0.41 to ± 0.60	=	Moderate or fairly correlation
± 0.61 to ± 1.00	=	Moderately high or very high correlation

4 RESULTS

Research Question One: What is the correlation between students' attitude and academic achievement in biology?

Table 1: Nature of Correlation between Students' Attitude and Academic Achievement in Biology (n=320)

Variables	$\sum X$	$\sum X^2$	$\sum XY_{r_{cal.}}$	Remark
	$\sum Y$	$\sum Y^2$		
Students' Attitude (X)	9959	333793	548068	0.401 Low positive correlation
Academic Achievement in Biology (Y)	16917	1015565		

n = 320, df = 318. * = significant at $p < 0.05$. **Source: Researchers' computation (2022).**

Result in Table 1 shows the nature of the correlation between students' attitude and academic achievement in biology. The result reveals correlation coefficient of 0.401 which means that there is low positive correlation between students' attitude and academic achievement in biology. It can be inferred from the results that students' attitudes lowly correlate their academic achievement in biology.

Research Question Two: What is the correlation between students' self-concept and academic achievement in biology?

Table 2: Nature of Correlation between Students' Self-Concept and Academic Achievement in Biology (n=320)

Variables	$\sum X$	$\sum X^2$	$\sum XY$	$r_{cal.}$	Remark
	$\sum Y$	$\sum Y^2$			
Students' Self-Concept (X)	9350	291390	510526	0.346	Low positive correlation
Achievement in Biology (Y)	16917	1015565			

n = 320, df = 318. * = significant at $p < 0.05$. **Source: Researchers' computation (2022).**

Result in Table 2 shows the nature of the correlation between students' self-concept and academic achievement in biology. The result reveals correlation coefficient of 0.346 which means that there is low positive correlation between students' self-concept and academic achievement in biology. The implication of this is that the more the students' self-concept, the better the academic achievement of students in biology. Therefore, the nature of the correlation between students' self-concept and academic achievement in biology is low positive. It can be inferred from the results that students' self-concept lowly correlates their academic achievement in biology.

Research Question Three: What is the correlation between students' study-habit and academic achievement in biology?

Table 3: Nature of Correlation between Students' Study-Habit and Academic Achievement in Biology (n=320)

Variables	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	$r_{\text{cal.}}$	Remark
Students' Study-Habit (X)	8529	241387	466534	0.379	Low positive correlation
Academic Achievement in Biology (Y)	16917	1015565			

n = 320, df=318. * = significant at $p < 0.05$. **Source: Researchers' computation (2022).**

Result in Table 3 shows the nature of the correlation between students' study habit and academic achievement in biology. The result reveals correlation coefficient of 0.379 which means that there is low positive correlation between students' study habit and academic achievement in biology. Therefore, the nature of the correlation between students' study-habit and academic achievement in biology is low positive. It can be inferred from the results that students' study-habit lowly correlates their academic achievement in biology.

TESTING OF HYPOTHESES

The hypotheses were tested using Pearson's Product Moment Correlation analysis with the help of SPSS Version 20.0 at 5% level of significant.

Hypothesis One: There is no significant correlation between students' attitude on academic achievement in biology.

Table 4: Correlation Between Students' Parental Involvement and Academic Achievement in Biology

Variables	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r_{cal}	$r_{\text{crit.}}$	Decision at $p < 0.05$
Students' Attitude (X)	9959	333793	548068	0.401	0.113	*
Academic Achievement in Biology (Y)	16917	1015565				

n = 320, df=318. * = significant at $p < 0.05$. **Source: Researchers' computation (2022).**

The result in Table 4 reveals that the calculated r (0.401) is greater than the critical r of 0.113 at the 0.05 level of significance with 318 degrees of freedom (df). The null hypothesis is rejected. This implies that, there is a significant correlation between students' attitude and academic achievement in biology. This means that students' attitude significantly correlates their academic achievement in biology.

Hypothesis Two: There is no significant correlation between students' self-concept and academic achievement in biology.

Table 5: Correlation Between Students' Self-Concept and Academic Achievement in Biology

Variables	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-cal	r-crit.	Decision at p<0.05
Students' Self-Concept (X)	9350	291390	510526	0.346	0.113	*
Academic Achievement in Biology (Y)	16917	1015565				

n = 320, df=318. * = significant at p<0.05. **Source: Researchers' computation (2022).**

Result in Table 5 reveals that the calculated r (0.346) is greater than the critical r of 0.113 at the 0.05 level of significance with 318 degrees of freedom (df). The null hypothesis is rejected. Hence, there is significant p<0.05 between students' self-concept and academic achievement in biology. This means that students' self-concept significantly correlates their academic achievement in biology.

Hypothesis Three: There is no significant correlation between students' study habit and academic achievement in biology.

Table 6: Correlation Between Students' Study-Habit and Academic Achievement in Biology

Variables	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-cal	r-crit.	Decision at p<0.05
Students' Study-Habit (X)	8529	2413887	466534	0.379	0.113	*
Academic Achievement in Biology (Y)	16917	1015565				

n = 320, df=318. * = significant at p<0.05. **Source: Researchers' computation (2022).**

Result in Table 6 reveals that the calculated r (0.379) is greater than the critical r of 0.113 at the 0.05 level of significance with 318 degrees of freedom (df). The null hypothesis is rejected. Hence, there is significant correlation between students' study-habit and academic achievement in biology. This means that students' study-habit significantly correlates their academic achievement in biology.

Summary of the Findings

The findings of this study are summarized as follows:

1. There exists significant low positive correlation between students' attitude and academic achievement in biology;
2. There exists a significant low positive correlation between students' self-concept and academic achievement in biology; and
3. There exists a significant low positive correlation between students' study-habit and academic achievement in biology.

Discussion of Findings

The findings of the result in Table 4 from the correlation analysis indicated that, there is a significant positive low correlation between students' attitude and academic achievement in biology. This is confirmed as the calculated r (0.401) is greater than the critical r of 0.113 at 0.05 level of significance with 318 degrees of freedom. The r -calculated of +0.401 indicated that there is a significant positive low correlation between students' attitude and academic achievement in biology. Attitude influence an individual's choice of action, and responses to challenges, incentives and rewards. Hence, Das *et al.*, (2014) opined that a person having positive attitude in one's life is helpful in facing any academic challenge. The finding of this study collaborates with the findings of Owino, Yungungu, Ahmed and Ogalla (2015), Bellah and Ugwumba (2015), Adekunle and Femi-Adeoye as well as Kolo, Jaafar and Ahmad(2017) who found that there is significant positive low correlation between students' attitude and academic achievement in science. This is contrary to the findings of Olasehinde and Olatoye (2014); Lalmuanzuali, Malsawmi and Lalchhandami (2019) who found no significant correlation in students' attitude and academic achievement in biology.

The findings of the result in Table 5 from the correlation analysis indicated that, there is a significant correlation between students' self-concept and academic achievement in biology. This is confirmed as the calculated r (0.346) is greater than the critical r of 0.113 at 0.05 level of significance with 318 degrees of freedom. The r -calculated of +0.346 indicated that there exists a significant positive low correlation between students' self-concept and academic achievement in biology. The findings obtained is in line with the findings of Ghazvini (2011), Sanchez and Roda (2015); Njoki1, King-White Kinaiand Kigen (2019) who found that there is a significant positive correlation between academic self-concept and academic achievement both in elementary and high schools' students. This is contrary to the results of Afuwape (2011), who found that there was no significant positive correlation between student's self-concept and academic performance in basic science.

The findings of the result in Table 6 from the correlation analysis indicated that, there is a significant correlation between students' study habit and academic achievement in biology. This is confirmed as the calculated r (0.379) is greater than the critical r of 0.113 at 0.05 level of significance with 318 degrees of freedom. The r -calculated of +0.379 indicated that there is a significant positive low correlation between students' study habit and academic achievement in biology. This could be attributed to students having the right study habit that is essential for acquiring good grades,

marks and useful for learning throughout one's life. Students agreeing to the attributes of possessing positive study habits indicates that they would prepare for what is ahead, and accomplish their academic goals. This is why Siddiqui and Ali (2018) stated that study habit plays an important role in the academic achievement of students and is closely associated with their success in examination. The finding is in line with Skirudeen and Sanni (2017) who found a significant positive low correlation between students' study habits (note taking, students' use of library and time allocation for study) and academic achievement in mathematics. The findings of this study also collaborate with that of Siddiqui and Ali (2018), who found a significant correlation between students' study habits and academic achievement of senior secondary school students in mathematics.

Educational Implications of the Findings

The findings of this study have some educational implications for students, biology teachers and parents as follows. The results of the study provide useful feedback of psychological variables as it correlates academic achievement. The feedback will provide the basis upon which students could build to enhance the efficacy to cultivate the right attitude and self-concept. In general, the study showed that student's attitude, self-concept and study habit have a significant positive low relationship on students' academic achievement in biology. This could be students' cultivating the right attitude, self-concept and creating time for their study. These results would have implication for biology teachers, classroom practice and students' academic attainment.

5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the findings and discussion of this study, it is concluded that students' attitude, students' self-concept and students study habit are the significant psychological variables that correlate students' academic achievement in biology in senior secondary schools in Uyo Local Government Area, Akwa Ibom State.

5.2 Recommendations

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

1. Students should have the right attitudes concerning biology. The students should like studying biology, think easily and wide in biology classes, feel very comfortable in biology class, make it very interesting, fascinating and fun as well as enjoyed studying biology in school and at home.
2. Students should have the perception about their physical, social and academic competence, believing that they can achieve it. The students should be advancing in learning to easily detect mistakes made by the classmate in biology, solve biology problems very easily, do biology assignment easily than any other science subjects, have satisfaction and confidence in lessons, improves understanding of other science subjects through studying biology, capable of making a good grade in biology as well

- as feel delighted when answering biology questions.
3. Students should make the studying of biology a habit and a lifestyle. They should stick to the schedule of time table to study biology, enjoy studying biology with peers, create extra time to study biology, seek a quiet place to study biology, study biology always, review the biology notes within one day after the class in which they were taken, review previous lesson notes and check biology notes to fill in any missed words soon after the lessons.
 4. Non-governmental organizations (NGOs), parent teacher association (PTA) and other stakeholders in education should encourage the teaching of biology by providing adequate financial support and biology text books for effective teaching and learning of biology

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