International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 7 Issue 3, March 2020

ISSN: 2394-4404

Predicting Secondary School Students' Interest In Biology Using Emotional Intelligence, Self-Efficacy And Self-Esteem

OKAFOR, Blessing Ifeoma

Department of Biology Education, Federal College of Education (Tech), Umunze, Anambra State, Nigeria

Prof. OKOLI, Josephine Nwanneka

Department of Science Education, Faculty of Education, Nnamdi Azikiwe University, Awka, Nigeria

Abstract: ***This study focused on predicting secondary school students' interest in biology using emotional intelligence, self-efficacy and self-esteem. Four research questions guided the study and eight hypotheses were tested. The design of the study was correlational survey. The population of the study comprised 63, 325 senior secondary school year two biology students in Anambra state out of which 2,204 students was sampled using a multi-staged procedure. Emotional Intelligence Scale (EIS), Academic Self-Efficacy Scale (ASES) and Self-adapted Esteem Scale (SES) validated by experts were used as instruments for data collection. The students' achievement was obtained from the schools' biology students' diary. The reliability of the instruments was established using Cronbach Alpha to be 0.68 for EIS, 0.80 for ASES, 0.75 for SES and 0.81 for BIS. The analysis of data was done using Pearson correlation cofficients and linear regressions. The findings of the study revealed that interest biology was significantly predicted by emotional intelligence and academic self-efficacy. Interest in biology was significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem. The study recommended that teachers of biology should manage their classroom in such a way that students employ their emotional faculties in the process of learning so as to maintain a high level emotional intelligence.***

Keywords: Emotional intelligence, self-efficacy, self-esteem, interest, biology

I. INTRODUCTION

Academic achievement and interest in learning are important factors in the teaching and learning of any subject including biology. Interest according to McEntarffer and Weseley (2016) is a relatively stable tendency to occupy oneself with an object of interest. It is an internal inclination that guides an individual through cognitive activities, including interests (in learning) related to all senses and values (Ainley & Ainley, 2011). Lack of interest in learning has been shown to be one of the causes of poor academic achievement. This is because the desire to learn more is the progenitor of interest in learning (Hacieminoglu, 2016). Although, biology is one of the most popular subjects in the secondary level of education, students' lack of interest in mastering the subject has become evident in their poor performances in external examination.

The problem of poor achievement have often been attributed to well-known factors such as teachers' choice of teaching method, lack of instructional materials and school/environmental related factors without much attention to the interest of the students in learning the subject. More so, there are barely any studies that border on students' psychological attributes and the roles the interaction of such characteristics play in the interest of students in learning. Such attributes as emotional intelligence, academic self-efficacy and self-esteem have been studied as correlates of achievement but not as individual predictors and co-predictors of interest in learning biology, and thus, have not been satisfactorily studied among Nigerian secondary school students. The study saw therefore, the need to explore these gray areas.

Emotional intelligence otherwise known as emotional quotient (EQ), according to Positive Psychology Program (2018), is the ability to monitor your own emotions as well as the emotions of others, to distinguish between and label

different emotions correctly, and to use emotional information to guide one's thinking and behaviour and influence that of others. Emotional intelligence refers to the ability to perceive, control, and evaluate emotions (Freedman, 2018). According to Brackett, Bertoli, Elbertson, Bausseron, Castillo and Salovey (2013), emotional intelligence is the ability to recognize, understand, utilize, and regulate emotions effectively in everyday life.

In the earliest research on emotional intelligence, Goleman saw emotional intelligence as a vital factor in success, especially for children. Goleman proposed that promoting social and emotional learning in children to boost their emotional intelligence would not only improve their learning abilities, it would also help them succeed in school by reducing or eliminating some of the most distracting and harmful behavioural problems (Goleman, 1998). The proposal by Goleman according to Positive Psychology Program (2018) has been welcomed by both the research community and the general public, and it is now almost taken for granted that emotional intelligence might be just as important - if not more important- for individual success than Inteliigent Quotient (IQ). Schools, educators, and education researchers have also heartily welcomed the idea that emotional intelligence is not simply a genetic, "you have it or you don't" sort of trait, but a set of skills that can be learned and improved upon (Ragini & Badri, 2018).

Many students at the secondary school level misinterpret their own emotional reactions (Schlegel, Fontaine, & Scherer, 2017), fail to control emotional outbursts, or act strangely under various pressures, resulting in harmful consequences to themselves, others, and their academic achievement (Schlegel, Mehu, Van Peer, & Scherer, 2018). Other students however, who have a greater ability to perform sophisticated information processing about emotions and emotion-relevant stimuli and to use this information as a guide for their own thoughts and behaviours could improve their academic achievement (Schutte, Palanisamy & McFarlane, 2016). To take a classical example, a student might get angry that the teacher gave assignments about topics the teacher did not teach. The students might become angrier when punished by the teacher for not doing the assignment. Such as assignment hold important place in the academic achievement of students, but the student in question out of anger may fail in such academic task. One popular maxim of Aristotle is that "Anyone can become angry- that is easy. But to be angry with the right person, to the right degree, at the right time, for the right purpose and in the right way- that is not easy". The ability referred to by Aristotle; that which consists in using the emotion for the right purpose, right person, right time and way is the domain of emotional intelligence (Van-der-Linden, Pekaar, Bakker, Schermer, Vernon, Dunkel & Petrides, 2017). Students who master their emotion through high EI abilities could have an improved academic achievement and success.

The importance of EI in the interest of students in the secondary school level of education is strengthened by the fact that as emerging adults, they confront important social and emotional stressors. These social and emotional problems affect the viability of the students in school environment which may in turn dwindle the interest in learning (Ms-Ramana, 2018). Secondary school students today confront various assignments from their teachers. They sometimes manifest stress in assigning proper time between academic and non-academic interests given the problems of peer pressure and unstable emotions (Amalu, 2018). Inability at such times to use emotion intelligibly begins to affect their interest in learning. It is no wonder students with high emotional intelligence thrive in the midst of emotional pressures (Ebrahimi, Khoshsima & Zare-Behtash, 2018) resulting from school environment, teachers, peers and parents. Such students may develop good academic self-efficacy and thrive in the academic world.

Self-efficacy according to Emily, Jody, Pauline and Patricia (2018) is the belief in one's own ability to be successful in a particular circumstance. It could be conceived as one's belief in one' capabilities to exercise control over their own functioning and over environmental event. Self-Efficacy is an individual's belief in the ability to achieve an expected outcome (Arcadius, 2018). It is the level of confidence an individual have in their ability to execute certain course of action or to achieve specific outcomes. Academic self-efficacy which is the focus of the study is a student's belief in the ability to complete academic tasks and activities successfully (Cherry, 2017). It is the belief students have of themselves that they possess the ability to deal with any academic issue and be successful in them. Therefore, academic self-efficacy is the belief of students that they can successfully accomplish any academic task.

In Bandura's idea, individuals with high self-efficacy beliefs also report strong feelings of well-being and high self-esteem in general. They are willing to take initiative in related domains, to apply effort if needed, and persevere in efforts as long as they believe in their efficacy (Radu, 2015). Potentially stressful situations produce less subjective stress in highly self-efficient individuals. Self-efficacy was an essential component to students' ability to complete daily classroom activities, perform well on standardized assessments, and succeed overall in school (John, Pamela, Peter & Peter, 2018). Compared with students who doubt their learning capabilities, those who feel efficacious for learning or performing a task participate more readily, work harder, persist longer when they encounter difficulties, and achieve at a higher level (John et al., 2018).

It is not surprising that high self-efficacy beliefs enhance school success; likewise, school failure inhibits relative self-efficacy beliefs, again partly depending on the individual's attribution patterns (Gaumer & Noona, 2018). Interestingly, it has been demonstrated repeatedly and in several cultures that in most domains healthy and happy students tend to slightly overestimate themselves (Cherry, 2017). On the other hand, major overestimation might result in painful and harmful clashes with reality. Such beliefs influence what courses of action students choose to pursue, the goals they set for themselves and their commitment to them, how much effort they put forth in given endeavours, how long they persevere in the face of obstacles and failure experiences, their resilience to adversity (John et al., 2018). Whether their thought patterns are self-hindering or self-aiding, how much stress and depression they experience in coping with taxing environmental demands, and the level of accomplishments they realize, informs improved academic performance (John et

al., 2018). Students with high self-efficacy approach difficult tasks as challenges and do not try to avoid them. Students' level of self-efficacy beliefs determine their level of motivation, as reflected in how much effort they will exert in an endeavour and how long they will persevere in the face of academic obstacles (Habila, Simon & Bala, 2016). Such belief is an element of self-worth or self-esteem.

Self-esteem refers to a person's overall sense of his or her value or worth (Junyi, 2018). It can be considered a sort of measure of how much a person values, approves of, appreciates, prizes, or likes him or herself (Von-Soest, Wagner, Hansen & Gerstorf, 2018). According to self-esteem expert Morris Rosenberg, self-esteem is quite simply one's attitude toward oneself. Rosenberg (1965) described it as a favourable or unfavourable attitude toward the self. Self-esteem reflects an individual's overall subjective emotional evaluation of their own worth. It is the decision made by an individual as an attitude towards the self. Self-esteem encompasses beliefs about oneself as well as emotional states. Self-esteem according to Coelho, Marchante, Marta and Jimerson (2017) is the positive or negative evaluations of the self, as in how we feel about it. Self-esteem is also used to refer to the way people evaluate their various abilities and attributes. For example, a student who doubts his ability in school is sometimes said to have low academic self-esteem, and a student who thinks she is popular and well liked is said to have high social self- esteem.

There are certain characteristics that distinguish one with high self-esteem. Examples of these characteristics are being open to criticism, acknowledging mistakes, being comfortable with giving and receiving compliments, and displaying a harmony between what one says, does, looks, sounds, and moves (Park & Park, 2014). People with high self-esteem are unafraid to show their curiosity, discuss their experiences, ideas, and opportunities. They can also enjoy the humorous aspects of their lives and are comfortable with social or student assertiveness (Crinchton, Templeton & Valdera, 2017). It is these characteristic that makes students with high self-esteem obtain higher achievement than those with low self-esteem. When they achieve low, they sense the opportunity to learn more assiduously, unlike the low-self-esteem student that may shrink back.

Low self-esteem is linked to violence, school dropout rates, teenage pregnancy, suicide, and low academic achievement (Dev & Ququieh, 2016). School-based programs that pair students with mentors and focus on relationships, building, self-esteem enhancements, goal setting, and academic assistance have been proven to enhance students' self-esteem, improve relationships with others, reduce depression and bullying behaviours (Phan, 2017). Similarly, school programs that focus on improving self-esteem through short, classroom-based sessions also have a positive impact on students' self-esteem, as well as reducing problem behaviours and strengthening connections between peers while improving academic achievement (Park & Park, 2014). The discourse thus far shows that emotional intelligence, self-efficacy and self-esteem are important in the learning interest of students.

PURPOSE OF THE STUDY

The purpose of the study was to investigate emotional intelligence, academic self-efficacy and self-esteem as predictors of interest in biology. Specifically, the study determined the:

- ✓ prediction of students' interest in biology by students' emotional intelligence.
- ✓ prediction of students' interest in biology by students' academic self-efficacy.
- ✓ prediction of students' interest in biology by students' self-esteem.
- ✓ joint prediction of interest in biology by emotional intelligence, academic self-efficacy and self-esteem.

RESEARCH QUESTIONS

The following research questions guided the study.

- ✓ To what extent does emotional intelligence predict students' interest in biology?
- ✓ To what extent does academic self-efficacy predict students' interest in biology?
- ✓ To what extent does self-esteem predict students' interest in biology?
- ✓ To what extent do emotional intelligence, academic self-efficacy and self-esteem jointly predict students' interest in biology?

HYPOTHESES

The following hypotheses were tested at 0.05 level of significance:

- ✓ Interest in biology is not significantly predicted by students' emotional intelligence.
- ✓ Interest in biology is not significantly predicted by students' academic self-efficacy.
- ✓ Interest in biology is not significantly predicted by students' self-esteem.
- ✓ Interest in biology is not significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

II. LITERATURE REVIEW

CONCEPTUAL FRAMEWORK

The conceptual framework of the study is depicted in Figure 1.

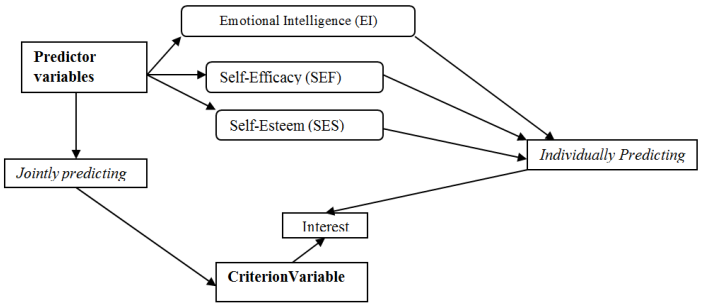

Figure 1: Conceptual Framework of the Study

As shown in Figure 1, the study established the prediction of the criterion variables, interest in biology, by the predictor variables namely: emotional intelligence, self-efficacy and self-esteem. The study also determined the joint prediction of the predictor variables on interest in biology. The study using the prediction power of the individual predictors established an equation of prediction for interest in biology.

III. THEORETICAL FRAMEWORK

In this section, review was made of those theories on which the study was anchored. The theories are the: theory of emotional intelligence by Daniel Goleman, Bandura's theory on self-efficacy and Braden's theory on self-esteem.

THEORY OF EMOTIONAL INTELLIGENCE BY DANIEL GOLEMAN

Daniel Goleman propounded his theory of emotional intelligence in 1998. The theory states that there exist an unrecognized but important human mental ability to reason about emotions and to use emotions to enhance thought. Goleman's emotional intelligence theory is based on the idea that success requires more than Intelligent Quotient (IQ), which has tended to be the traditional measure of intelligence, ignoring essential behavioural and character elements. There are very practical reasons to promote social and emotional learning in schools, from kindergarten through college. This is because; some students are academically brilliant and yet are socially and inter-personally inept.

According to Goleman, bullying, disciplinary problems, violence and drug abuse are reduced in schools with a high emotional intelligence. With a solid basis in emotional intelligence, academic performance as well as behaviour improves. There is an obvious connection to Goleman's third, motivational component: learning stimulates curiosity and promotes feelings of satisfaction, interest, even joy, when students immerse themselves in the process of assimilating new information. The emotional intelligence of students starts developing long before they ever enter a classroom. But emotional intelligence levels will vary widely, depending on each child's home environment. Thus, teachers must be able to recognize those children whose emotional literacy needs a boost. Teachers should be ready to talk about feelings in the classroom. The message is that no emotion is "wrong," but certain ways of expressing those emotions or acting on them are indeed inappropriate.

The implication of Goleman's emotional intelligence theory to this study is that students' classroom setting should be the sort that allows students to express emotion. Such emotional expression should be used by the class teacher and school counsellor for diagnostic and remedial purposes. The theory also implied that teachers should model appropriate use of emotion as a way of boosting students' emotional intelligence. The theory further suggests that educational stakeholders should organize occasional extramural activities to improve students' emotional intelligence with the goal of boosting academic achievement and interest in learning. Goleman's emotional intelligence theory did not cover self-efficacy and self-esteem. For Goleman, emotional intelligence is one of the components of personality trait. Thus, there is the need to review other theories relating to self-efficacy and self-esteem.

BANDURA'S THEORY ON SELF-EFFICACY

Bandura proposed the self-efficacy theory in 1977. The theory states that self-efficacy reflects confidence in the ability to exert control over one's own motivation, behaviour, and social environment. The concept of self-efficacy is central to psychologist Albert Bandura's social cognitive theory, which emphasizes the role of observational learning, social experience, and reciprocal determinism in developing a personality.

The basic idea behind self-efficacy theory is that when individuals feel their actions can influence the outcome of a given situation, several things happen. For one, they feel much better about themselves. Second, they feel that they have a sense of power and control over what happens in the world. And finally, they do not float hopelessly from one activity to the other. They actually act, think, and feel differently than people who have no self-efficacious beliefs. This is all related to interest and motivation, or the drive to perform, because it revolves around the beliefs that peoples' feelings and actions are based more on what they believe to be true rather than what may or may not be objectively true. In other words, a person who has self-efficacy believes that his feelings and actions actually have influence over the outcome of a given situation. For Bandura, self-efficacy and self-esteem are highly inter-related. Thus, a person with high self-esteem is efficacious and may have high self-efficacy.

The implication of the theory of self-efficacy to the study is that students must have a healthy mindset that they can accomplish whatever academic task at their level in order to improve academically. Also, for the learning to be interesting, teachers must give students tasks and academic activities which are within the confines of what students believe they can do. The theory also suggests that positive feedback about academic accomplishment should be given to students as a way of boosting their beliefs in their ability to accomplish academic tasks.

BRADEN'S THEORY ON SELF-ESTEEM

Nathaniel Braden propounded the theory of self-esteem in 1994. The theory states that while others (parents, teachers, and friends) can nurture and support self-esteem in an individual, self-esteem also relies upon various internally generated practices. These consisted, in Branden's framework, of six "pillars" of self-esteem:

- ✓ Living consciously: the practice of being aware of what one is doing while one is doing it, that is., the practice of mindfulness.
- ✓ Self-acceptance: the practice of owning truths regarding one's thoughts, emotions, and behaviours; of being kind toward oneself with respect to them; and of being for oneself in a basic sense.

- ✓ Self-responsibility: the practice of owning one's authorship of one's actions and of owning one's capacity to be the cause of the effects one desires.
- ✓ Self-assertiveness: the practice of treating one's needs and interests with respect and of expressing them in appropriate ways.
- ✓ Living purposefully: the practice of formulating goals and of formulating and implementing action plans to achieve them.
- ✓ Personal integrity: the practice of maintaining alignment between one's behaviors and convictions.

Branden distinguished his approach to self-esteem from that of many others by his inclusion of both confidence and worth in his definition of self-esteem, and by his emphasis on the importance of internally generated practices for the improvement and maintenance of self-esteem.

The implication of the theory to the present study is that teachers have role of not just orienting the students on how to improve on their self-esteem but bringing them to a fuller recognition of their role and personal lifestyle in the development of self-esteem. The theory implies that students must do their part as individuals to build self-esteem. Therefore, school and classroom management and practices should allow students the opportunity to be responsible for their learning, assert themselves during classroom instruction through contributions they make, and be conscious of their academic goals.

IV. EMPIRICAL STUDIES

Alexander-Stamatios, Natassa and Nikos (2016) investigated the relationship between trait emotional intelligence and vocational interest of Greek 10^{th} and 11^{th} grade students. The purpose of the study was to explore the relationship between emotional intelligence and vocational interest. One hypothesis was tested on the relationship between emotional intelligence and vocational interest. The design of the study was correlational survey. The population of the study comprised all Greek students attending 10^{th} and 11^{th} grade in the regional unit of Imathia in Northern Greece. Total sample involved in the study was 272 Greek students. The instruments for data collection were Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF) by Petrides, Sangareeau, Furnhum and Frederickson (2006) and Self-Directed Search (SDS) by Holland (1994) which was used to measure vocational interest. The internal consistency of the TEIQue-ASF was 0.76 while that of SDS ranged from 0.77 to 0.84. Data generated from the study was analyzed using mean, t-test, one way ANOVA and Pearson correlation. The findings of the study revealed that emotional intelligence has a significant low positive relationship with vocational interest.

The reviewed study sought to establish the relationship between emotional intelligence and vocational interest while the current study seeks to examine the relationship between emotional intelligence and learning interest. The reviewed study was conducted outside Nigeria, while the present study was conducted using secondary school biology students in three education zones in Anambra state, Nigeria.

Andrea and Ursula (2012) conducted a study titled: Emotional intelligence and social interest: are they related constructs? The purpose of the study was to establish the relationship between the emergent construct of emotional intelligence and social interest empirically. One hypothesis was tested in the study. The design of the study was correlational survey. The population of the study comprised all the students in psychology and educational science of Ramon Llull University, Barcelona. Total sample for the study was 116 students. The instruments for data collection were Social Interest (SI) scale developed by Crandall (1975) and the Spanish adapted version of TMMS-24 by Fernández-Berrocal, Extremera and Ramos (2004) which was used to assess emotional intelligence. The internal consistency of TMMS-24 was .90 for emotional attention, .90 for emotional clarity and .86 for emotional repair respectively. Other instruments were the Symptom Chechlist-90 for psychological distress and Eysenck Personality Questionnaire for personality. The data generated from the study was analysed using t-test, correlation and stepwise multiple regression. The findings of the study showed that emotional intelligence and its subscales was not significantly correlated to social interest.

The study correlated emotional intelligence and social interest whereas the present study sought to correlate emotional intelligence and interest in learning. The reviewed study further sought to predict psychological stress and personality structure while the present study sought to predict academic achievement and interest using emotional intelligence, self-efficacy and self-esteem as co-predictors.

Adeyinka, Adedeji and Adeniyi (2011) investigated locus of control, interest in schooling and self-efficacy as predictors of academic achievement among junior secondary school students in Osun state, Nigeria. The purpose of the study was to examine locus of control, interest in schooling and self-efficacy as predictors of academic achievement of junior secondary school students. The study however established in the analysis the relationship between self-efficacy and interest. The design of the study was ex-post-facto. The population of the study comprised students from twenty-five secondary schools in Osun state. Total sample for the study was 500 students in JSS3. The instruments for data collection were the Trace's academic Locus of Control Scale, Interest in School scale by Mitchell (1993) and Self-efficacy Scale by Morgan and Jinks (1999). Interest scale has Cronbach Alpha reliability index of .79 and Self-efficacy scale had Cronbach Alpha reliability index ranging from .66 to .78 with overall index of .80. The academic achievement of the students was determined from their scores in the promotional examinations in English language, Mathematics and Integrated Science. The method of data analysis was multiple regression, ANOVA and multiple correlation. The findings of the study revealed that significant correlation exist between the three variables and between self-efficacy and interest.

The current study is different from the reviewed study in design whereas the present study adopted correlational survey. The subject area of focus is biology and not the combination of English language, mathematics and Integrated Science as was used in the reviewed study. More so, the present study involved senior secondary school students and not junior secondary school students.

Markku and Anna (2007) investigated self-efficacy, interest and task performance. The purpose of the study was to examine how possible changes in self-efficacy and interest during a task relate to each other and whether such changes independently predict overall task performance. The study also correlated self-efficacy and interest in the study. One hypothesis tested the relationship between self-efficacy and interest. The design of the study was correlational survey. The population of the study comprised ninth-grade students in Southern Finland out of which 100 students drawn to participate in the study. The instruments for data collection were Self-efficacy and Interest scale. The reliabilities of self-efficacy scale ranged from 0.74 to 0.86 while that of interest scale ranged from .78 to .89. Data collected from the study was analyzed using Bivariate latent growth curve model within the structural equation modeling framework. The findings of the study revealed that changes in interest and self-efficacy were positively correlated.

Markku and Anna determined a model for predicting students' performance using self-efficacy and changes in interest, the present study differed from the reviewed study as it sought to examine the prediction of academic achievement and interest in biology by self-efficacy which was one of the co-predictors.

Gregory (2012) conducted a study on predicting interest in and attitude towards science from personality and need for cognition. The purpose of the study was to predict interest and attitude using the various dimensions of personality. Six hypotheses were addressed in the study. The design of the study was correlational. The population of the study comprised undergraduate students enrolled in introductory psychology courses in small public Liberal Arts College in Virginia. Total sample for the study was 655 undergraduate students. The instrument for data collection included Specific Attitude Inventory-II (SAI-II) by Moore and Foy (1997) and the Big-Five Inventory by John, Donahue and Kentle (1991). SAI-II had alpha reliability range of .58 to .89 while Big-Five inventory had reliability index range of .79 to .88. The method of data analysis was zero order correlation, multiple and stepwise regressions. The findings of the study revealed among others that extraversion was negatively related to interest.

The reviewed study was conducted using college students while the present study involved secondary school students. The study established the prediction of interest using students' personality structure while the present study sought to predict interest using self-esteem, self-efficacy and emotional intelligence jointly.

Abdellatif, Rima, Haneen and Noof (2017) investigated a path analysis of students' interest in STEM, with specific reference to Qatari students. The study sought to explore the factors that help predict students' interest in Science, Technology, Engineering and Mathematics (STEM) in Qatar. Three research questions were raised and three hypotheses were tested in the study. The study involved a nation-wide survey of preparatory and secondary levels of education in Qatar implemented in 2015, and data from a sample of 660 preparatory (middle) and secondary (high) school students was used. The instrument for data collection was Qatar Education survey Questionnaire. The questionnaire had it validity established by component analysis with correlation range of .7 to .8 and reliability index of 0.74. Data from the study was analysed using factor analysis. Factor analysis extracted five valid dimensions and a path analytic model suggested that student interest in STEM is influenced by teachers, perceptions of homework assignments, self-confidence and intention to pursue further study. Gender and level of education were also identified as variables likely to affect student interest in a STEM field.

The present study did not establish a path model for predicting interest but established the prediction powers of self-efficacy, self-esteem and emotional intelligence on interest in learning. Again, the design of the study reviewed was survey while the present study is correlational survey.

V. METHOD

RESEARCH DESIGN

The design of the study is correlational survey. Correlational study according to Nworgu (2015) is one which seeks to establish what relationship exists between two or more variables of interest to the researcher. Such studies indicate the direction and magnitude of the relationship between the variables. Nworgu further noted that such studies employ a special group of statistics known as correlation coefficients or regression analysis for data analysis. All predictive studies according to Nworgu are correlation studies. It is for this reason that the design was adopted for the study, since, it was predictive and established the relationship between the variables of the study.

AREA OF THE STUDY

The area of the study is Anambra state. Anambra is a state in southeastern Nigeria. Boundaries in Anambra state are formed by Delta State to the west, Imo State and Rivers State to the south, Enugu State to the east, and Kogi State to the north. The major urban centres of Anambra state are Onitsha, including Okpoko; Nnewi, and Awka, the state capital.

The six education zones are: Aguata, Awka, Otuocha, Nnewi, Ogidi and Onitsha with a 256 secondary schools scattered over the Education Zones.

POPULATION OF THE STUDY

The population of the study is 63, 325 (30, 930 males and 32, 395 females) senior secondary school year two (SS2) biology students (Source: Planning, Research and Statistics Department, Post Primary School Service Commission, Awka, 2018).

SAMPLE AND SAMPLING TECHNIQUE

The sample for the study is 2, 304 SS2 biology students. The sample for the study was obtained using multi-stage procedure. The stage by stage procedure was as follows: first, three education zones were selected at random out of the six

ISSN: 2394-4404

education zones in Anambra state. Secondly, using random sampling, 12 schools were selected from each of the three education zones. Finally, in each of the schools, SS2 biology students were selected at random for the study.

INSTRUMENTS FOR DATA COLLECTION

The instruments for data collection are Emotional Intelligence Scale (EIS), Academic Self-Efficacy Scale (ASES), Self- adapted Esteem Scale (SES), Biology Interest Scale (BIS) and Schools' Biology Students' Diary.

The Emotional Intelligence Scale (EIS) was from the Indigenous Emotional Intelligence Scale Developed by Olukayode (2017). The scale was a combination of Bar-on (1997) and Goldman's (1995) models of emotional intelligence. The scale has 40 items with seven factors/dimensions bordering on interpersonal skills, empathetic response, stress tolerance, optimism, assertiveness, problem-solving and flexibility. For the sake of the study however, these dimensions were not indicated in the instrument. Also, slight modifications were made in the items in the instrument to suit the purpose of the current study. EIS is a five point scale ranging from 1, "not true of me" to 5 "true of me".

Academic Self-Efficacy Scale (ASES) was adapted from the Academic Self-Efficacy Scale developed by Abdul and Mohammed (2006) from Bandura's theory on self-efficacy. ASES is a 40 item scale designed on a five point scale ranging from 1- "Exactly true", through 2- "Nearly true", 3- "Neutral", 4- "Nearly False", and 5- "Exactly False". The dimensions of academic work measured by the instrument as developed by the researcher are learning process, reading, comprehension, memory, curricular activities, time management, teacher student relationship, peer relationship, utilization of resources, goal orientation, adjustment and examination. There are 20 positive and 20 negative statements in the 40 statements in the scale. The adaptation done involve the removal of six items reducing the number of items in the scale to 36 items. A few of the sentences were altered to suit the purpose of the study.

Self-Esteem Scale (SES) was adapted from Okwaraji, Nduanya, Obiechina, Onyebueke and Okorie (2018) who re-validated, established the reliability and used the Rosenberg Self-Esteem Scale (RSES) among Nigerian secondary school students. SES is consists of 10 item designed on four point scale. The scale ranged from 4- "strongly agree", through 3- "agree", 2- "Disagree" to 1- "strongly disagree". SES like all other instruments is a self-report measure for assessing self-esteem. Only slight changes were made in sentences in two of the items in the scale.

Biology Interest Scale (BIS) was adapted from Edokwe (2018). The instrument was therefore, modified by removing part A that determined students demographic information and changing the statement all through the instrument to focus on biology. BIS was designed on four point scale of strongly agree, agree, disagree and strongly disagree. BIS contained 25 items which are declarative statements with which the students are to indicate their interest.

VALIDATION OF THE INSTRUMENT

The instruments, objectives of the study, research questions and hypotheses were given to two lecturers from the Department of Science Education and the Department of Educational Foundations Nnamdi Azikiwe University, Awka. They were requested to vet the instrument in terms of clarity of language, sentence structure and items relatedness to the construct being measured. The validates were also demanded to write 'R', 'M' and 'D' against any items they need the researcher to retain, modify and delete. Their corrections were effected in the final copy of the instruments.

RELIABILITY OF THE INSTRUMENTS

The reliability of instruments was established using Cronbach's Alpha. The instruments were administered to 30 students in Ogidi Education Zone. The scores generated were subjected to Cronbach's Alpha computation. The reliability coefficient obtained for EIS, ASES, SES and BIS were 0.68, 0.80, 0.75, 0.81 respectively.

METHOD OF DATA COLLECTION

The instrument was administered to the students through the help of six research assistants. The research assistants were briefed on the purpose of the study, the instruments and how to administer them as well as how to collate the students' academic achievement as contained in the diary. The research assistants and the researcher took the instrument to the schools and work closely with the regular biology teacher in each school. They briefed the biology teacher on the purpose of the study and procedure to administer the instrument to the students. Because the instrument was administered at random to available biology students, the students were required to write their number in the attendance register on the instruments. Any student who could not remember their number in the attendance register requested the number from their form teachers. Where the practice of calling the attendance register with the serial numbers of member students is non-existent, the research assistant requested the teachers to call the register and give the students their attendance number before administering the instruments.

The instrument was given to the students who took them home for the whole day and to return it the next day. The biology teachers upon the return of the instruments cross-examined them to ensure that the students responded to all the items in all the instruments. Where a student did not respond to any item, the teacher immediately request such student to respond to the omitted items before submission. The research assistants upon collecting the instruments from the biology teachers further cross-examined them again to make sure that all the items were responded to by each student. The research assistants also cross checked that each student's biology score is recorded by the biology teacher according to the attendance number which the students indicated on the instruments. All the instruments were returned to the researcher and under the supervision and guidance of the researcher, the instruments were scored. The scores were collated by the researcher, typed and sent to a data analyst for analysis.

METHOD OF DATA ANALYSIS

Data generated from the study were analyzed using simple linear and multiple regressions. The interpretation of the correlation coefficient was according Nworgu (2015) who provided a three-way guide for interpreting correlation coefficient values when a large number of pairs of scores have been correlated. They are as follows: $r = \pm.30$ *and below*, low relationship; $r = \pm.30$ *to below* ± 0.80, moderate relationship and $r = \mp.80$ and above, high relationship. The null hypotheses were tested at 0.05 level of significance and the following decision rule: reject the null hypothesis whenever Pvalue is less than or equals 0.05 (P≤0.05), do not reject null hypothesis whenever Pvalue is greater than 0.05 (P>0.05).

VI. RESULT

RESEARCH QUESTION 5: To what extent does emotional intelligence predict students' interest in biology?

Model	R	R^2	Adjusted R^2	Std. Error	Decision
1	.081[a]	.007	.006	8.849	Low positive relationship

a. Predictors: (Constant), Emotional Intelligence

Table 1: Extent of Prediction of Students' Interest in Biology by Emotional Intelligence

Table 1 shows a low positive relationship (R = 0.081) between students' emotional intelligence and their interest in biology. The R-Square value of 0.007 indicates that 0.7% of the variance in interest scores is predicted by emotional intelligence.

RESEARCH QUESTION 6: To what extent does academic self-efficacy predict students' interest in biology?

Model	R	R^2	Adjusted R^2	Std. Error	Decision
1	.074[a]	.005	.005	8.854	Low positive relationship

a. Predictors: (Constant), Self-efficacy

Table 2: Extent of Prediction of Students' Interest in Biology by Academic Self-Efficacy

Table 2 shows a low positive relationship (R = 0.074) between students' academic self-efficacy and their interest in biology. The R-Square value of 0.005 indicates that 0.5% of the variance in interest scores is predicted by academic self-efficacy.

RESEARCH QUESTION 7: To what extent does emotional intelligence predict students' interest in biology?

Model	R	R^2	Adjusted R^2	Std. Error	Decision
1	.019[a]	.001	.000	8.877	Low positive relationship

a. Predictors: (Constant), Self-esteem

Table 3: Extent of Prediction of Students' Interest in Biology by Academic Self-Esteem

Table 3 shows a low positive relationship (R = 0.019) between students' self-esteem and their interest in biology. The R-Square value of 0.001 indicates that 0.1% of the variance in interest scores is predicted by academic self-esteem.

RESEARCH QUESTION 4: To what extent do emotional intelligence, academic self-efficacy and self-esteem jointly predict students' interest in biology?

Model	R	R^2	Adjusted R^2	Std. Error	Decision
1	.085[a]	.007	.006	8.851	Low Positive Relationship

a. Predictors: (Constant), Self-esteem, Self-efficacy, Emotional Intelligence

Table 4: Extent of Prediction of Students' interest in Biology Jointly by Academic Emotional Intelligence, Academic Self-Efficacy and Self-Esteem

Table 4 shows a low positive relationship (R = 0.085) among students' emotional intelligence, academic self-efficacy, self-esteem and their interest in biology. The R-Square value of 0.007 indicates that 0.7% of the variance in interest scores is jointly predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

HYPOTHESIS 5: Interest in biology is not significantly predicted by students' emotional intelligence.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1191.211	1	1191.211	15.211	.000[b]
	Residual	180272.615	2302	78.311		
	Total	181463.826	2303			

a. Dependent Variable: Interest

b. Predictors: (Constant), Emotional Intelligence

Table 5: ANOVA on Significance of Students' Emotional Intelligence Prediction of Interest in Biology

Table 5 shows that at 1df numerator and 2303df denominator, the F-value is 15.211 with a Pvalue of .000 which is less than 0.05. The null hypothesis was rejected. Therefore, interest in biology is significantly predicted by students' emotional intelligence.

HYPOTHESIS 6: Interest in biology is not significantly predicted by students' academic self-efficacy.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	986.908	1	986.908	12.588	.000[b]
	Residual	180476.918	2302	78.400		
	Total	181463.826	2303			

a. Dependent Variable: Interest

b. Predictors: (Constant), Academic Self-efficacy

Table 6: ANOVA on Significance of Students' Academic Self-Efficacy Prediction of Interest in Biology

Table 6 shows that at 1df numerator and 2303df denominator, the F-value is 12.588 with a Pvalue of .000 which is less than 0.05. The null hypothesis was rejected. Therefore, interest in biology is significantly predicted by students' academic self-efficacy.

HYPOTHESIS 7: Interest in biology is not significantly predicted by students' self-esteem.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.357	1	63.357	.804	.370[b]
	Residual	181400.469	2302	78.801		
	Total	181463.826	2303			

a. Dependent Variable: Interest

b. Predictors: (Constant), Self-Esteem

Table 7: ANOVA on Significance of Students' Self-Esteem Prediction of Interest in Biology

Table 7 shows that at 1df numerator and 2303df denominator, the F-value is .804 with a Pvalue of .370 which is greater than 0.05. The null hypothesis was not rejected. Therefore, interest in biology is not significantly predicted by students' self-esteem.

HYPOTHESIS 8: Interest in biology is not significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1299.783	3	433.261	5.531	.001[b]
	Residual	180164.044	2300	78.332		
	Total	181463.826	2303			

a. Dependent Variable: Interest

b. Predictors: (Constant), Self-esteem, Self-efficacy, Emotional Intelligence

Table 8: ANOVA on Significance of Students' Emotional Intelligence, Academic Self-Efficacy and Self-Esteem Prediction of Interest in Biology

Table 8 shows that at 3df numerator and 2303df denominator, the F-value is 5.531 with a Pvalue of .001 which is less than 0.05. The null hypothesis was rejected. Therefore, interest in biology is significantly co-predicted by students' emotional intelligence, academic self-efficacy and self-esteem.

Since there was a significant joint prediction by the predictor variables of interest in biology, the regression values for predicting the criterion variable is presented in Table 9.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	46.894	3.018		25.481	.000
	Emotional Intelligence	.080	.046	.122	1.740	.082
	Self-efficacy	-.029	.048	-.042	-.603	.547
	Self-esteem	-.054	.053	-.021	-1.019	.308

a. Dependent Variable: Interest

Table 9: Students' Emotional Intelligence, Self-Efficacy and Self-Esteem Prediction of Interest in Biology

The regression equation for the prediction of achievement score in biology therefore is:

Interest in Biology = 46.894 + .080(Emotional Intelligence) - .029(Academic Self-efficacy) - .054(Self-esteem)

VII. DISCUSSION

The findings of the study showed that emotional intelligence is a significant predictor of interest in biology. This observation could be attributed to the fact that emotional intelligence enables the students to understand their emotional challenges in their academic pursuit. A student, who may be feeling sad on account of any failure either in examination or class exercises and test, can understand such emotions and be able to regulate them. Such emotional regulation begets academic tolerance and resilience needed to continue any academic endeavor and to stay positively minded despite the challenges. When students possess high emotional quotient, they send positive energy that sparkles their academic environment, creating a happy atmosphere of learning where anybody can be accommodated. Such environments makes learning all the more interesting seeing that any student can be accommodated and receive assistance for their academic needs.

EI helps to promote social and emotional learning in children; to boost their emotional intelligence would not only improve their learning abilities, it would also help them succeed in school by reducing or eliminating some of the most distracting and harmful behavioural problems. As Athanasios and Chara (2018) puts it, being able to understand your emotions is fundamental to understanding what it is that will make one more high-functioning and achieve more academically. The findings of the study also support that of Alexander-Stamatios, Natassa and Nikos (2016) that emotional intelligence has a significant low positive relationship with vocational interest. Andrea and Ursula (2012) findings that emotional intelligence and its subscales was not significantly correlated to social interest contradicts the findings of the study.

The findings of the study showed that academic self-efficacy is a significant predictor of interest in biology. High academically self-efficacious student have positive mindset, bordering on their confidence is the belief that they can accomplish any academic task no matter how difficult or challenging. Such mindset makes the learning all the more interesting to the students since they stay focused on the goals of any academic endeavour. Students' academic self-efficacy is often built upon past successes, especially ones that challenged the student and were overcome with abundant effort and therefore results in the interest to try other related or default academic task. The more the students master such tasks, the more they improve achievement. Therefore, students who had greater levels of academic self-efficacy were more likely to work harder to complete a challenging task and achieve more academically. The findings of the study are in line with that of Adeyinka, Adedeji and Adeniyi (2011) that significant correlations exist between the three variables and between self-efficacy and interest. The findings of the study also lend credence to that of Markku and Anna (2007) that changes in interest and self-efficacy were positively correlated.

The findings of the study revealed that self-esteem is not a significant predictor of interest in biology. Low self-esteem students may attribute failure to low ability and may therefore, lack the confidence to try further. When such lack of motivation sets in, the students will begin to lack interest in the learning. Failure indeed means something different depending on the students' level of self-esteem. For low self-esteem students, it could mean that one does not fit in and therefore, any further attempt to continue wanes and results in lack of interest. The worth which students perceive of themselves as the study established may however affect achievement and interest. This is because the students' criteria for self-evaluation may not be academically related. In such case, self-esteem may not predict achievement and interest in learning.

VIII. CONCLUSION

The study concludes that emotional intelligence and academic self-efficacy are significant predictors of achievement in biology. The study also establishes that emotional intelligence, academic self-efficacy and self-esteem together are significant predictors of interest in biology.

IX. RECOMMENDATIONS

The following recommendations are made based on the findings of the study:

- ✓ Students should be given academic task that range from simple or known to difficult task. When tasks are arranged such that students face simple tasks first, they build confidence in their abilities, a pre-requisite for attempting the difficult tasks.
- ✓ Teachers of biology should manage their classroom in such a way that students employ their emotional faculties in the process of learning so as to maintain a high level emotional intelligence.

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