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TEST ANXIETY AND SELF CONCEPT AS PREDICTORS OF SECONDARY SCHOOL STUDENTS ACADEMIC ACHIEVEMENT IN BIOLOGY IN NNEWI EDUCATION ZONE OF ANAMBRA STATE, NIGERIA

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Abstract

This study was carried out to determine the relationship between Test anxiety and Self-concept as predictor of secondary school students' achievement in Biology in Nnewi Education Zone of Anambra State, Nigeria. Three research questions and three null hypotheses guided the study. The study was correlational research design with a population of 2,229, and sample size of 339 senior secondary three students (SSSIII) respectively. The sample size was obtained based on Taro Yamane principle and distributed using the proportionate stratified sampling technique. The instruments for data collection were Biology Achievement Test (BAT), Biology Text Anxiety Scale (BTAS) and Self-Descriptive Questionnaire (SDQ). The BTAS and SDQ were based on a Four-point Likert format and were used to gather data on students' Test-anxiety and Self-concept. Student Academic Achievement Scores (SAA) were obtained from the teacher made test. The BTAS and SDQ were validated by three experts, one from Measurement and Evaluation Department, two from Science Education Department, and both from Chukwuemeka Odumegwu Ojukwu University. The reliability co-efficient of 0.73 and 0.74 were established using Cronbach Alpha for BTAS and SDQ respectively, while that of the BAT, was done using Kuder Richardson 20 (K-R-20) to obtain a reliability index of 0.775. Research questions and hypotheses were analyzed using simple and multiple regression analyses tested at 0.05 level of significance. Findings showed that Test-anxiety has a significant prediction on academic achievement of senior secondary school students in biology; Self-concept has a significant prediction on achievement of senior secondary school students in biology; test-anxiety has significantly predicted the academic achievement of male and female senior secondary school students in biology class; Self-concept significantly predicted the achievement of male and female senior secondary school students in biology class; and test-anxiety and self-concept had a joint and significant predictive power on achievement of senior secondary school students in biology in Nnewi Education Zone of Anambra State. Based on the findings of the study, educational

implications were discussed. Recommendations included that Biology teachers be trained on how to improve and sustain students' Test Anxiety and Self Concept in Biology. The study contributed to knowledge in that it revealed the nexus between test-anxiety and self-concept on students learning outcomes by showing that test anxiety (TA) and self-concept (SC) are psychological constructs that secondary school teachers in their respective discipline must critically pay attention to especially as it concerns biology in Nnewi Education Zone of Anambra State.
Keywords: Test Anxiety, Self Concept, Students, Academic Achievement and Biology.

Introduction

The teaching of biology in general and genetics in particular in schools enable students to acquire broad knowledge, skills and attitudes that would equip them to solve their personal and societal problems as they develop into adults. Thus, the biological knowledge of Genetics is to guide youngsters to develop competences for solving such problems that are related to gene. Biology specifically is essentially taught in schools so as to equip students with different kinds of knowledge, skills and depositions for problem recognition, identification and solving within the competitive environment. Therefore, understanding genetic factors and principles is important for societal and economic development of human in it's recognized environment.

Genetics is the branch of biology that studies the process or mechanism of heredity. Genetics is the scientific study of hereditary and variation in living things (Michael, 2015). It was introduced in the school certificate biology syllabus in the mid-1970s, and it covers the following aspects: variations, monohybrid crossings, sex-determination, co-dominance and mutation. It focuses on establishing the scientific basis for understanding of how characteristics or traits are being transferred from parents to their offspring, from one generation to another. The scientific understanding of genetics principles over time had also lead to the social and technological advancement of man as well as application of genetics in industry. For instance, in modern times, genetic engineering is used to improve the quality of crops and domestic animals (Tamarin, 2017). Another interesting application of genetics to solve problems is when deoxyribonucleic acid (DNA) is used in crime detection and establishing of paternity where there is dispute among others.

Despite the relevance of genetics, students still face the problem of poor academic achievements in both internal and to an extent in external examinations. Academic achievement is an outcome of learning which expresses the extent to which instructional objectives have been met (Oghenevwede, 2019). It is the outcome of education that shows the extent to which students have attained their educational stated objectives as well student's cognitive attainment in the core subjects at school level. Uzoamaka and Ebere (2021) opined that academic achievement is the major decisive factor by which the efficacy

and success of any teaching-learning process could be assessed and evaluated. A report of West African Examination Council Chief Examiner report (2022) revealed that a total of 1,686 students out of 5,467 students that registered and sat for WAEC 2022 examination passed biology at credit grades and above, while a total of 3,782 failed the subject. The implication is that only 30.8% of the total population of biology students passed at credit grade level and above, while 69.2% failed the subject. Recall that distinction at West African Examination is pegged at 70% therefore a percentage below 30.8% made a distinction in 2022 WAEC examination. The report from Chief Examiner of WAEC (2022) specifically indicated that (i) candidates showed poor conceptualization of genetic concept (ii) poor understanding of certain genetic terms eg. Pure breeding, nucleotide, hybrid, dominant and recessive characters (iii) poor performance in questions in genetics and drawing of poor genetic diagrams (iii) not giving titles on diagrams as demanded (iv) inability to cross the genetics questions properly (v) poor performance towards question that require knowledge application (vi) poor spelling of technical terms and scientific words (vii) inabilities of candidates to adhere to guidelines regarding biological drawings. It has been observed that students' performance/achievement in Biology in most certified examination likes, Senior School Certificate Examination (SSCE) conducted by both the West African Examination Council (WAEC) and National Examination Council (NECO) have not been satisfactory in Nigeria (Ashmorg et al. 2021).

The trend of poor achievement by the Nigerian students offering biology as indicated in the WAEC analysis from the examination apex body, from 2015 to 2022 showed that the pass rate at credit level decreases gradually. These have continued to cost students wholesome score in biology examination since inability of Biology students to answer questions on genetics correctly affects their overall achievement in Biology. As biology students continue to achieve poorly in genetics, they tend to dislike the concept, thus giving it a difficult status as well as tendency of avoiding questions on genetics in examination (Ishiaku, 2017). Research effort on causes of achievement gap in biology abounds. For instance, Ikani (2018) opined that poor achievement in Biology could be attributed to poor method of teaching, teacher personality and insufficient instructional materials. Also, research conducted by Ishiaku (2017); Adejoh (2017) and Ikani (2018) revealed that persistent use of inappropriate teaching method particularly the traditional lecture method such as "calling student to reside one after the other" has resulted in poor conceptual understanding of the genetics.

Traditional lecture method (TLM) of instruction is an entirely teacher centered instructional methods, where students are placed and perceived as empty sheet on which knowledge is written. Students are placed on dormant mode with the teacher as knowledge originator (Samuel & Obikezie, 2020). It is a do as I talk system of learning where students assume a

passive position and dwell more in listening and taking notes. Biology teachers' preference to TLM could be attributed to the fact that it benefits them in terms of instructional time and wider scheme coverage. However, TLM has not stopped to show deficiency in enhancing conceptual understanding of Biology concepts (Nnorom, 2019). This therefore gave credence to some learner centered methods of instructions such as discussion method, inquiry method, scaffolding strategy among others which really does not encourage active participation of students. With these instructional methods in use for decades, achievement in Biology is yet to improve desirably (Macmillan & Joseph, 2020). Perhaps, these methods focused merely on enhancing conceptual understanding through some hands-on and mind-on activities with little or no attention to psychological condition or state of the learners' mindset particularly towards evaluation, tests and examinations, which are affected by test anxiety.

Test anxiety is one of the most important aspects of negative motivation and has direct debilitating effect on school performance (Mohd, 2019). It is a kind of anxiety which turn out especially during examination. Test anxiety could be seen as distress experienced by some test-takers, while evaluating the knowledge, physical fitness, skills and aptitude of the test-taker in games, drama, audition and many more. Tests and examinations at all stages of education, especially at secondary education level have been considered an important and powerful tool for decision making in our competitive society, with people of all ages being evaluated with respect to their academic achievement (Habibullah & Ashraf, 2019). Test anxiety is an undesirable reaction toward evaluation. Test anxiety is a psychological condition in which students experience extreme distress and anxiety in test situations. Cherry (2020) outlined some factors responsible for test anxiety to include: history of poor testing outcome, being unprepared for test, poor conceptual understanding and subsequent fear of failure.

In academic activities, achievement test are used in all educational institutions to making decision about students' performance. Each student's grade is a result of their performance on tests and examinations; because of this, many students or people being tested or examined are anxious when they are in these testing situation. All students experience test anxiety at least once in their life whenever they are writing examinations or being tested academically. Cassady (2020) assumed that during testing situations anxiety interferes with students' ability to remember and utilize information that has been stored in the short or long term memory or that has been mastered. Anxiety affects performances during testing situation; feelings of worry or cognitive manifestation of anxiety such as negative expectation for success and concerns about one's performance can interfere with performances by diverting attention from the test at hand.

The prevalence of test anxiety' has been reported by many researchers; according to number of different studies about 10% to 41% of elementary and secondary school students suffer from the effects of test anxiety (Whitaker *et al.*, 2020). These research findings imply that increase in test anxiety lowers academic achievement of students' in Physics, Chemistry and Mathematics. Also, findings in a study by Ndirangu (2018) and Kavakci, (2017) revealed relationship between test anxiety and academic achievement of computer students. Therefore, understanding the role and position of text anxiety towards the capacity, efficiency and value, which may result in positive perceptions of an individual becomes a necessity; hence, self-concept.

Self-concept is the cognitive aspect of how individual view themselves. It is the complex system of how beliefs are learned, opinions and attitudes that individuals have about themselves. Misbah et al., (2019) stated that individuals form their self-concept during interaction with their associating environment. Xu et al., (2017) argued that individual with high self-concept have a low test anxiety. This means that students with unimproved self-concept will have a reduced test anxiety. Senthil (2017) found that negative self-perceptions will reduce self-concepts of students. Misbah et al. (2019) posited that self-esteem and self-concept are related to each other; individuals with high self-esteem also have high self-concept and individuals who realize their self-worth will produce better outcomes by knowing what they are capable of and what they cannot do. Sari et al. (2018) then examined the relationship between test anxiety and self-esteem in senior high school students. The study revealed that female students showed more test anxiety than male students and those who had` higher self-esteem has less test anxiety. The result showed that gender predicts test anxiety and test anxiety level correlated negatively with test anxiety level.

Studies conducted on the relationship between academic self-concept and academic achievement revealed that one could say authoritatively that the two variables positively influence one another. Earlier, Cherry (2020) found a significant relationship between self-concept and academic achievement in physics. On the other hand, findings by Oludipe (2019) revealed a significant relationship between students' self-concept and academic achievement in Chemistry. Additionally, Coon and Mittere (2019) found a close relationship between self-concept and academic performance in high school students in mathematics. Relying on these studies, inferred that there is an undeniable relationship between self-concept, achievement, improved performance in physics, chemistry and mathematics respectively. Perhaps, Biology teacher's ability to give credence to self-concept may result in a boom on achievement in Biology.

Over time, achievement deficiencies among biology students have continued to receive research attention judging from a number of researches so far done in that regards. So far, research effort to boost achievement in biology has intensified as concerns on how to enhance achievement in Biology irrespective of gender. Gender is one of the factors interacting with achievement and studies on it have been unresolved as some researchers found that male students have higher achievement than female students (Novak & Mosunds, 2018). Gender refers to the socially constructed characteristics of women and men such as norms, roles and relationships of and between groups of women and men. Soyibo (2017) pointed out that gender refers to the social attributes and opportunities associated with being male and female, the relationships between women and men, girls and boys, and the relations between woman and between men. Gender determines what is expected, allowed and valued in a women or a man in a given context. In most societies, there are differences and inequalities between women and men in the decision making, opportunities, responsibilities assigned, activities undertaken and access to and control over resources (Ocha, 2017).

Several studies have examined the relationship between gender, self-concept and academic achievement. Most of these studies support the belief that self-concept is a strong facilitator of academic achievement not minding the gender. Similarly, to the best of researchers' knowledge, the issue of gender difference in text anxiety, self-concept and academic achievement in Genetics has not been resolved. Thus, the researcher wishes to investigate text anxiety and self-concept as predictors of senior secondary school students' academic achievement in Biology.

Statement of the Problem

Over time, biology students' inability to achieve meaningfully in the subject has been a source of concern to biology educators and has continued to receive research attention. In addition to abundance of empirical evidence, reports of WAEC Chief Examiners revealed students' achievement gap in biology. Inability to demonstrate mastery of biology concepts informed by poor conceptual understanding of biology contents, were some of the weakness identified by WAEC Chief Examiners as contributing to the achievement gap in subject. Research effort so far in addressing ameliorating achievement gap in biology seems not enough and is delimited to enhancing achievement by means of conceptual understanding through learner engagement in activities with little or no credence to the emotional state (anxiety) and self-conceptualization of the learner. Hence, test anxiety and self-concepts, anxiety and self-concepts connote the emotional state with which a learner approaches examinations. Improved achievement in biology may not be feasible unless biology students' anxiety as well as self-concepts are better considered and accounted for. Studies that address

students' poor achievement in biology appear not to have considered and focused on test anxiety and self-concept as an important variable of students' academic achievement. As achievement in biology continues to deteriorate, the place of test anxiety and self-concept in relation to academic achievement in biology becomes a concern. In addition, the issues of gender differences in biology as regards to test anxiety and self-concepts is yet unknown. It is on this concern that the current study seek to understand the relationship between test anxiety, self-concept and students' achievement in biology. Therefore the problem of the study calls to mind: test anxiety and self-concepts as predictors of secondary school students' achievement in biology.

Purpose of the Study

The main purpose of this study is to investigate test anxiety and self-concept as predictors of secondary school students' achievement in genetics. Specifically, the study sought to determine the:

1. Predictive value of test anxiety on academic achievement of secondary school students in genetics.
2. Predictive value of self-concept on academic achievement of secondary school students in genetics.
3. Predictive moderating value of test anxiety on academic achievement of male and female secondary school students in genetics.

Research Questions

The followings research question guided the study.

1. What is the predictive value of test anxiety on academic achievement of secondary school students in genetics?
2. What is the predictive value of self-concept on academic achievement of secondary school students in genetics?
3. What is the predictive value of test anxiety on academic achievement of male and female secondary school students in genetics?

Hypotheses

The following null hypotheses were formulated to guide the study at 0.05 alpha level of significance.

1. Test anxiety does not significantly predict academic achievement of secondary school students in genetics.

2. .Self-concept does not significantly predict academic achievement of secondary school students in genetics.

3. Test anxiety do not significantly predict male and female achievement in genetics.

Methodology

Correlational research design was adopted for the study. The study was conducted in public secondary schools in Nnewi Education Zone of Anambra State. The population of the study comprised all the 2,229 secondary school students III (SSSIII) biology students in co-educational schools in Nnewi Education Zone. The sample size for the study consisted of 339 biology students (200 females and 139 males). The sample size was obtained based on Taro Yamane principle and distributed using the proportionate stratified sampling technique. Three instruments were used for the study. The first instrument was Biology Achievement Test (BAT) consisted of 50 objectives questions structured by the researcher from SSIII Biology curriculum for senior secondary school topics on genetics. The BAT has had two sections A and B. Section A elicited information from participant on their personal data while Section B consisted of 50 objectives test items with A to D options specifically meant to collect responses, evaluating students Achievement in Biology (Genetics). The items was marked using the BAT marking guide.

The second instrument was Biology Text Anxiety Scale (BTAS) developed by Cassady and Johnson (2002) which was used to determine the level of student's test anxiety in Biology. The adapted instrument has 27 items in which the researcher modified to 20 items in order to meet the demand of the present study towards assessing student's test anxiety. The BTAS have two distinct portions, namely sections A and B. The first section A would elicit background information from the participating students on their personal data On the other hand, section B contained 20 items and was scored on a four-point scale type of Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1.

The third instrument was Self-Descriptive Questionnaire (SDQ) developed by the researcher in assessing students' self-concept (believe) in biology. The SDQ however contains 20 items, having two sections, namely; Section A and B. Section A focused on the respondents' demographic variables while Section B contained 20 structured items statement towards regenerating responses from the respondent on a Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

The instrument was validated by three experts one from Measurement and Evaluation Department, and two from Science Education Department, both from Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus. The questionnaire was administered to the respondents with the help of one research assistant. A total of 339 numbered BAT was administered, out of which all dully participated and collated on the spot. The reason is to

ensure that it were those students that responded to the questionnaires participated in the test. The reliability of the instrument was determined using Cronbach Alpha formula and the result of the analysis shows that Biology Test Anxiety Scale (BTAS) yielded a cronbach alpha coefficient of 0.73, while Self-Descriptive Questionnaire (SDQ) yielded cronbach alpha of 0.74 using Pearson Product Moment Correlation (r). These results are indications that the instruments all have internal consistency. Data were analyzed using simple linear and multiple regressions. The research questions from 1 to 3 were addressed via the utilization of simple linear regression analysis. Hypotheses 1-3 were examined through the application of regression ANOVA in a simple linear regression analysis. The data analyses were conducted using the Statistical Package for the Social Sciences (SPSS), specifically version 26.

Research Question One: What is the predictive value of test anxiety on achievement of secondary school students in genetic?

Table 1: Regression Analysis of Test Anxiety on Achievement of Secondary School Students in Genetic

Model	R	r^2	Adjusted r^2	Std. Error of the Estimate
1	.70	.5900	.487	11.25

a. Predictors: (Constant), Test Anxiety in Genetic

The regression analysis shown in Table 1 examined the relationship between students' test anxiety and their academic achievement in genetic. The table displays the linear regression model of test anxiety that was derived from a sample of 339 biology students. The data indicated that there was a correlation of 0.70 between test anxiety and academic achievement in genetic. This suggests a somewhat positive link, with a coefficient of determination (r^2) of 0.59. This means that biology academic achievement is predicted by test anxiety in 59 percent of students.

Research Question two: What is the predictive value of self-concept on achievement of secondary school students in genetic?

Table 2: Regression Analysis of Students' Self-Concept Predicting their Achievement in Genetic.

Model	R	r^2	Adjusted r^2	Std. Error of the Estimate
1	.906[a]	.83	.370	6.64204

a. Predictors: (Constant), Self-Concept in Genetic

The regression analysis in Table 2 examined the relationship between students' self-concept and their academic achievement in genetic. The table displays the linear regression model of self-concept that was derived from a sample of 339 biology students. The analysis demonstrates a strong positive relationship between self-concept and students' academic achievement in biology. The correlation coefficient (r) of 0.906 and coefficient of determination (r^2) of 0.83 indicated a high predictive power of self-concept on academic achievement. Thus, 83 percent of students' academic achievement in genetic can be accurately predicted based on their self-concept.

Research Question Three: What is the predictive value of test anxiety on achievement of male and female secondary school students in genetic?

Table 3: Regression Analysis of Students' Test Anxiety Predicting Male and Female Students' Achievement in Genetic.

Gender	r^2	r^2	Adjusted r^2	Std. Error of the Estimate
Male	.708[a]	.510	.051	6.64204
Female	.610[a]	.472	.370	6.37861

a. Predictors: (Constant), Test Anxiety in Biology

The regression analysis presented in Table 3 examined the relationship between the test anxiety of male and female students and their achievement in biology. The table displayed the linear regression model of biology acquired for 139 male and 200 female biology students. The data demonstrated that there is a connection of 0.708 between the test anxiety of male students and their achievement in Biology. This indicated a relatively good association, with a coefficient of determination (r^2) of 0.510. Thus, half of the academic achievement of male students in biology can be accurately estimated based on their test anxiety. Furthermore, there exists a connection of 0.610 between the test anxiety of female students and their achievement in biology. This correlation suggested a somewhat good link, with a coefficient of determination (r^2) of 0.472. Biology achievement in female students is predicted by their test anxiety at a rate of 47.2 percent. These findings suggested that male

students' test anxiety is a significant predictor of high academic achievement compared to female students.

Model	Sum of	Squares	Df	Mean Square	F	Sig.
Regression	3984.807	1	3984.807	18.788 .000[b]		
Residual	488241.677	2302	212.095			
Total	492226.484	2303				

Hypothesis Testing

Hypotheses One: Test anxiety does not significantly predict academic achievement of secondary school students in genetic

Table 4: Regression ANOVA on Significance of Students' Test Anxiety Prediction of Achievement in Genetic.

Model	Sum of	Squares	Df	Mean Square	F	Sig.
Regression	3984.807	1	3984.807	18.788 .000[b]		
1 Residual	488241.677	2302	212.095			
Total	492226.484	2303				

a. Dependent Variable: Achievement b. Predictors: (Constant), Test Anxiety

According to Table 4, when there is 1 degree of freedom in the numerator and 2302 degrees of freedom in the denominator, the F-value is 18.788. The corresponding P-value is .000, which is smaller than the significance level of 0.05. The null hypothesis was rejected. Hence, students' test anxiety is a strong predictor of achievement scores in Biology.

Hypotheses Two: Self-concept does not significantly predict academic achievement of secondary school students in genetic.

Table 5: Regression ANOVA on Significance of Students' Self-Concept Prediction of Achievement in Genetic.

Model	Sum of	Squares	Df	Mean Square	F	Sig.
Regression	.054	1 .054	.199	.006[b]		
1 Residual	71.982	264 .273				
Total	72.522	265				

a. Dependent Variable: Achievement b. Predictors: (Constant), Self-concept

According to Table 5, when there is 1 degree of freedom for the numerator and 264 degrees of freedom for the denominator, the F-value is 0.199 with a P-value of 0.006, which is lower than 0.05. The null hypothesis was refuted/rejected. Hence, students' self-concept is a strong predictor of achievement scores in Genetic.

Hypotheses Three: The predictive value influence of male and female biology student on test anxiety and achievement is not significant

Table 6: Regression ANOVA on Significance of Test-Anxiety on Achievement of Male and Female Students

Model		Sum of	Squares	Df	Mean Square	F	Sig.
	Regression	. 7452.020	2	7452.020	15.732 .004		
2	Residual	230684.104	3402	312.876			
	Total	238136.124	3404				

a. Dependent Variable: Achievement b. Predictors: (Constant), Test-Anxiety

According to the information that is presented in Table 6, it is possible to see that the F-value is 15.732 when the numerator degrees of freedom (df) are set to 2, and when the denominator df are set to 3402. The associated P-value was calculated and found to be .004, which is significantly lower than the significance threshold of 0.05 that was established earlier. As a consequence of this, we cannot accept the null hypothesis on the basis of these results. Therefore, the influence of male and female biology student on test anxiety and achievement is significant. As a result, one may draw the conclusion that the male and female student on test anxiety strong determinants of the amount of achievement they have in biology.

Discussion

Findings on the predictive value of test-anxiety on academic achievement of secondary school students in genetics showed that test-anxiety has a significant prediction on academic achievement of senior secondary school students in biology. This means that higher test-anxiety has the propensity to result in higher academic achievement for senior secondary school students. This implies that a student subjected to test-anxiety might gain additional 34% in aggregate test score. The outcome of the study also has empirical supports and disagreements. The work of Mkpaoro and Nwagu (2020) agrees that students' test anxiety predicts their academic achievement such that there a high positive relationship between the rural students' test anxiety and their academic achievement in mathematics. This was however, countered by Shakir (2019) which found an inverse relationship (negative correlation) between the academic achievement and the academic anxiety groups of senior

secondary school student in Biology. These conflicting outcomes suggest that test anxiety could have either negative or positive implications on students' academic achievement. However, they agreed that test anxiety is a predictor of academic achievement.

Findings on the predictive value of self-concept on academic achievement of secondary school students in genetics revealed that self-concept has a significant prediction on academic achievement of senior secondary school students in genetics. This means that self-concept significantly predicts 17% of academic achievement of senior secondary school students in genetics. Outcome of previous study was mixed and conflicting in literature with a study from Igbo et al (2018) postulating presence of no significance influence whereas the work of Kamoru, and Ramon (2017), Largea et al (2017) and Lee and Kung (2017) avers positive implication of self-concept for academic achievement. These studies saw the positive effects either as a combined interaction of other variables like students' attitude and study habit groups (Igbo et al, 2018). This is why Largea et al (2017) infer that the perceived positive effect of self-concept does not directly predict students' academic achievement. Lee and Kung (2017) further posit that the previous effect of self-concept also significantly predicted subsequent achievements.

Findings on the predictive value of test anxiety on academic achievement of male and female secondary school students in biology showed that test-anxiety has significantly predicted about 21% of the academic achievement of male and female senior secondary school students in biology class. This means that test-anxiety brings about 21% improvement in the male and female students academic achievement. Inferential statistics showed that there is a significant difference between failure anticipation of cognitive test anxiety and academic performance of male and female students in public secondary schools (Bethel-Eke & Ikpa, 2017). Further analysis and result showed that male scores higher than female when gender interacts with other variables on academic achievement (Lee & Kung (2017).

Conclusion

The researcher concludes that students' test-anxiety and self-concept are predictors of achievement of students in biology subject. That is, increasing extent of test-anxiety as well as preference to higher self-concept enhances students' achievement in biology. Specifically, a student with higher test-anxiety but low self-concept level is guaranteed of about 21% chance of enhanced achievement, while the one with improved self-concept without prior pressure from the test gains 6% chance of higher achievement. However, a student with self-concept and heightened test-anxiety gains higher prediction (about 52%) of achievement in biology.

In addition, gender significantly influences the predictive value of Test-anxiety and Self-concept on students' achievement. Thus, joint predictive value of Test-anxiety and Self-

concept on achievement of biology students in secondary schools is significant in Nnewi Education Zone of Anambra State.

Recommendations

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

1. Secondary school administrators should encourage teachers to employ strategies such as reinforcements that would put students under academic pressure, build confidence and perhaps increases their study habits.
2. There are needs for biology teachers to discuss positive learning experiences among the students so as to boast their self-concept and towards improving their achievements especially in biology.
3. Biology students should try to study hard for test and examinations, cultivate and develop thoughts about themselves and self-worth; this would help them towards developing some confidence on themselves and towards their academic challenges.

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