

## Test Anxiety as a Predictor of Secondary School Students' Achievement in Biology in Onitsha Education Zone

Ejelue Ifeyinwa Vivian & Abigail M. Osuafor PhD

Department of Science Education,  
Nnamdi Azikiwe University, Awka

### Abstract

*The study investigated test anxiety as a predictor of secondary school students' academic achievement in biology in Onitsha Education Zone. Two research questions guided the study and two hypotheses were tested at 0.05 level of significance. Correlational survey design was adopted for the study. The population of the study was 4,734 senior secondary school year two (SS2) students offering biology in Onitsha Education Zone. A sample of 1,200 students was involved in the study. The instrument for data collection was Test Anxiety Inventory (TAI) validated by three experts. The reliability of the instrument was established using Cronbach Alpha which yielded coefficient values of 0.74. Students' achievement scores in Biology for two most recent terms were obtained from the teachers' diary and used for the study. Data was generated for the study through the administration of the instruments with the aid of research assistants. The data obtained were analyzed using simple and multiple linear regressions. The findings of the study revealed that 0.6% of the variance in achievement in biology was predicted by students' test anxiety. Also, achievement score in biology was significantly predicted by students' test anxiety. It was recommended that effort should be made by students to study hard for tests and examinations by ensuring read, make notes of important points and seek help from other students from whom they can learn those concepts they find difficult.*

**Keywords:** test, anxiety, biology, achievement, predictor

### Introduction

Anxiety is one of the common phenomena among men, which affect their performance in different situations. Students are not immune to anxiety especially for a test or examination. Although, low level test anxiety could motivate students to work hard and attain good academic achievements, high level of debilitating test anxiety could be so complicating as to limit the students' achievement (Ali & Moshin, 2013). The problem of test anxiety has been observed among science students (including those studying Biology) who most of the time perceive the subject to be broad, lack the skills for science inquiry and therefore, have poor understanding of the concepts. These academic challenges according to Anakwe and Dikko (2017) have just one end result which is poor achievement.

Biology is the study of life. The study of Biology has so many branches and cut across so many science disciplines such as biophysics, biochemistry, atomic and molecular Biology, biotechnology, pathology, microbiology, parasitology and virology. The dawn of the viral disease COVID-19 caused by the COVID-2 virus has made the importance of Biology very glaring in recent times. The disease which is one of the world's greatest pandemic has left man at the mercy of virologist and other scientists as they wait for a vaccine and cure. The pandemic has affected the world severely in all ramifications and some of the effects may remain permanent. Given the changes which the pandemic has caused, everyone now seeks understanding into the viral nature of the disease and how to end it whether locally or

scientifically. These efforts and enlightenment campaigns on how to avoid and prevent the spread of the disease is another glaring importance of Biology especially the aspect of virology.

Scientists consider the pandemic as a development even though it incites a great level of fear in many. This could scare students away from Biology and Biology-related subjects especially in developing countries. The situation is worsened by the fact that the education system all over the world has been adversely affected (Viner, Russell, Croker, Packer, Ward, Stansfield, Mytton, Bonell & Booy, 2020). The government of every nation now deliberates on new system of education which could be ICT-laden/driven to minimize physical contact (Melnick & Darling-Hammond, 2020). The situation puts developing countries like Nigeria at a great disadvantage. Thus, compounding the problem of Biology students who use laboratory for experiment and team work as scientists. WAEC Chief Examiner's Reports (2017) also showed that students' were unable to use technical terms to describe some process as well as incorrect definition of biological terms. The Chief Examiner's Report (2018) also showed that students were unable to study the whole parts of the syllabus and majority could not give correct answers to questions. Furthermore, the Chief Examiner's Reports (2019) showed that students were unable to spell technical terms, express their answers in clear English words and answer questions on some biological topics like ecology and genetics. One question that comes to mind becomes: Does test anxiety affect students' achievement scores?

Test anxiety is a psychological condition in which people experience extreme distress and anxiety in testing situations (Olisaememeka & Solarin, 2019). Azeem (2018) described it as a combination of physiological over-arousal, tension and somatic symptoms, along with worry, dread, fear of failure and catastrophizing, which occur before or during test situations. Many students experience some degree of stress and anxiety before and during examinations and test anxiety can actually impair learning and reduce test achievement. The multidimensionality of test anxiety has been a subject of debate, however, this study however, adopted the four dimensions developed in 1995 by Hodapp which covers worry, emotionality, inference and lack of confidence.

Worry was conceptually defined by Ringeisen, Buchwald and Hodapp (2010) as cognitive expression of concern about one's own performance (example: I ask myself whether my performance will be good enough). Emotionality refers to autonomic reactions which tend to occur under examination stress such as 'my heart pound'. Inference has to do with how the cognitive domain is assessed to capture disruptive thinking (example: distracting thoughts keep popping into my head) while lack of confidence denotes lack of faith in one's own performance such as the expression "I have faith in my own performance". According to Udean (2012) test anxiety causes students debilitating anxiety and difficulties in studying or performing adequately in their examinations. Thus, test situations induce feeling of inadequacy, helplessness, heightened body reactions, anticipations of punishment or loss of status and esteem and implicit attempts of leaving the examination.

Students who have high test anxiety may not be able to study well which will result in poor Biology achievement. The role of test anxiety in the teaching and learning of Biology and how the factors predict Biology achievement need to be explored. Understanding the way students' test anxiety predict achievement in Biology is therefore a worthwhile quest. Also, the predictive association between these the various dimensions of test anxiety on Biology achievement is very important in enhancing students' achievement in the subject.

### **Purpose of the Study**

The purpose of the study is to investigate test anxiety as a predictor of secondary school students' achievement in Biology. Specifically, the study investigated the:

1. Extent to which test anxiety predicts students' achievement scores in Biology.
2. Relative contributions of the individual dimensions of text anxiety (worry, emotionality, inference and lack of confidence) in the prediction of students' achievement scores in Biology.

### **Research Questions**

The following research questions guided the study.

1. To what extent does test anxiety predict secondary school students' achievement scores in Biology?
2. What are the contributions of the individual dimensions of text anxiety (worry, emotionality, interference, lack of confidence) in the prediction of secondary school students' achievement scores in Biology?

### **Hypotheses**

1. Test anxiety is not a significant predictor of secondary school students' achievement scores in Biology.
2. The individual dimensions of text anxiety (worry, emotionality, inference, lack of confidence) are not significantly predictors of secondary school students' achievement scores in Biology.

### **Method**

The study adopted the correlational survey design. The area of the study is Onitsha Education Zone of Anambra state. The population of the study is 2,337 senior secondary school year two (SS2) Biology students in Onitsha Education Zone. The sample for the study is 1,200 Biology students drawn through multistage sampling procedure involving, first, stratifying the secondary schools located in each of the three local government areas in Onitsha Education Zone according to their location. At the second stage, five secondary schools were drawn from each local government area using purposive sampling techniques amounting to a total of 15 schools. The purpose for which the 15 schools were drawn was to ensure that the selected schools are located in different local government areas within the zone to for greater coverage. Finally, in each 15 secondary schools, 80 SS2 Biology students who results are in the teachers' diary will be selected for the study giving a sample size of 1,200 students.

The instrument for data collection was Test Anxiety Inventory (TAI). Test Anxiety Inventory (TAI) was adapted from Frances, Diana, Tobias, Sonja and William (2015). TAI has four subscales measuring worry, emotionality, interference and lack of confidence. The scale worry assesses disruptive concerns about individual performance and the consequences of failure, emotionality accesses emotional and physical tension, interference assesses distraction from the task by irrelevant thoughts, and lack of confidence measures low confidence to master academic challenges. In the TAI instrument, students are instructed that the inventory referred to the thoughts and feelings they generally experienced in an examination situation (tests, written or oral exams). It comprises of 20 items with 5 items measuring worry, 5 items measuring emotionality, 5 items measuring interference and another 5 items measuring lack of confidence. TAI is designed on a four-point scale ranging from 1, "almost never" through 2, 'never', 3, 'always' to 4 "almost always". The changes made were that the original instrument had three subscales and one other scale was added to make it four; the scales were labeled and the number values assigned were removed. Some incomplete statements were also modified.

The instrument was validated by experts from the Department of Science Education and the Department of Educational Foundations and one experienced Biology secondary school teacher. The reliability of the instrument was established using Cronbach's Alpha to be 0.74. The instruments for the study were administered in two phases with the help of six research assistants who are fellow postgraduate students. The research assistants were briefed on how to administer the instruments with the help of the regular Biology teachers in each school to be used. The researcher and the research assistants obtained the Biology achievement scores of each student from the Biology teachers' diary and use their serial number as a code of the instruments those students were given. Data from the study were analyzed using simple and multiple regressions. The null hypotheses were tested at 0.05 level of significance. The decision rule was to reject the null hypothesis whenever Pvalue is less than or equal to alpha level of 0.05 ( $P \leq 0.05$ ) and not to reject null hypothesis whenever Pvalue is greater than 0.05 ( $P > 0.05$ ).

## Results

**Research Question 1:** To what extent does test anxiety predict secondary school students' achievement scores in Biology?

**Table 1: Extent of Prediction of Students' Achievement in Biology by Test Anxiety**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error	Decision
1	.083 <sup>a</sup>	.007	.006	14.429	Low positive relationship

a. Predictors: (Constant), Test Anxiety

Table 1 shows a low positive relationship ( $R = 0.083$ ) exists between students' test anxiety and their achievement in biology. The R-Square value of 0.006 indicates that 0.6% of the variance in biology scores is predicted by test anxiety.

**Research Question 2:** What are the contributions of the individual dimensions of text anxiety (worry, emotionality, interference, lack of confidence) in the prediction of secondary school students' achievement scores in Biology?

**Table 2: Contributions of the Individual Dimensions of Test Anxiety in the Prediction of Achievement Scores in Biology**

Model		Unstandardized		Standardized	t	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
	(Constant)	70.841	2.420		29.268	.000
	Worry	.070	.145	.015	.486	.006
	Emotionality	-.007	.140	-.002	-.051	.060
	Interference	.088	.144	.020	.613	.045
	Lack of Confidence	-.142	.146	-.033	-.979	.001

a. Dependent Variable: Achievement

Table 2 shows the standardized beta coefficient which indicates correlation between variables. The unstandardized beta coefficient which shows the prediction powers of each dimension of test anxiety which indicates their relative contribution to achievement in biology. The table shows that worry has a low positive relationship ( $R = 0.015$ ) between with students' their achievement in biology, emotionality has a low negative relationship ( $R = -$

0.002) with achievement in biology, while interference has a low positive relationship ( $R = 0.020$ ) with achievement where lack of confidence has a low negative relationship ( $R = -0.033$ ) with achievement in biology. Worry is shown to contribute 0.70 to achievement in biology whenever a students' worry for a test increase by one unit. With a unit increase, emotionality decreases achievement by  $-0.007$ , while interference increases achievement by  $0.088$ , where lack of confidence decreases achievement by  $-0.142$ . The order of relative contribution to achievement in biology from the highest to lowest by each dimension of test anxiety is; lack of confidence ( $-0.142$ ), followed by interference ( $0.088$ ), worry ( $0.070$ ) and then emotionality ( $-0.007$ ).

**Hypothesis 1:** Test anxiety is not a significant predictor of secondary school students' achievement scores in Biology.

**Table 3: ANOVA on Significance of Prediction of Achievement in Biology by Students' Test Anxiety**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1715.623	1	1715.623	8.241	.004 <sup>b</sup>
1 Residual	249409.709	1198	208.188		
Total	251125.333	1199			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Test Anxiety

Table 3 shows that test anxiety is a significant predictor of achievement scores in biology  $F(1, 1199) = 8.241$ ,  $P(0.004) < 0.05$ . The null hypothesis was rejected. Therefore, test anxiety is a significant predictor of secondary school students' achievement scores in Biology.

**Hypothesis 2:** The individual dimensions of text anxiety (worry, emotionality, inference, lack of confidence) are not significantly predictors of secondary school students' achievement scores in Biology.

**Data relating to hypothesis 2 is contained in Table 2.**

Table 2 shows that worry is a significant predictor of achievement scores in biology,  $t = 0.486$ ,  $P(0.006) < 0.05$ , interference is a significant predictor of achievement scores in biology,  $t = 0.613$ ,  $P(0.045) < 0.05$  and that lack of confidence is also a significant predictor of achievement scores in biology,  $t = -0.979$ ,  $P(0.001) < 0.05$ . Table 2 further shows that emotionality is not a significant predictor of achievement scores in biology,  $t = -0.979$ ,  $P(0.060) > 0.05$ .

## Discussion

The study showed that a low positive relationship exist between students' test anxiety and their achievement in biology with test anxiety predicting 0.6% of the variance in biology scores. Worry, interference and that lack of confidence dimensions of test anxiety are the only significant predictors of achievement scores in biology with lack of confidence contributing more to poor achievement in biology. Test anxiety was also shown to be a significant predictor of achievement in biology. Test anxiety could be facilitating or debilitating. High facilitating test anxiety implies that a student have confidence and is not worried about a test. The feeling of confidence does not interfere negatively with the student preparation for the test resulting in an improved achievement in biology. The case is different for students who have high debilitating test anxiety.

Debilitating test decreases students' confidence in their ability to pass a test. The lack of confidence interferes with their ability to prepare for the test. The interference could be cognitive or affective. When cognitive, students find it difficult to understand the material they are studying or reading, forgets the one they have read and are forced to go back studying one thing over and over without moving on. The feeling of not having covered enough content areas incites cognitive overload, a feeling which makes the students' head full. At this time, the students feel they cannot accommodate what they are reading. When the interference is affective however, they lose confidence and do not see the need to study. At such time, they concluded they have failed while they have not even taken the test or examination. The whole feeling of lack of confidence and interference with cognitive processes result in a serious worry for the test and examination.

Worry culminates in feelings of panic and manifests itself in other psychological and physiological ways such as increased heart rates. Students in the examination or test hall are seen sweating profusely, expresses fear of failure, have random thoughts that are not test related running through their mind and end up frustrated. At this time, a simple question which is known to the student appears so difficult that the student will not answer it. The whole process results in poor achievement and failure. According to *Segool et al.* (2013), inferior performance arises not because of intellectual problems or poor academic preparation, but because testing situations create a sense of threat for those experiencing test anxiety; anxiety resulting from the sense of threat then disrupts attention and memory function.

The finding of the study contradicts the finding of Eman, Hind, Rufa, Nadiah and Brouj (2016) that there was no significant relationship between test anxiety and students' GPA and that the relationship between test and students' academic level was negative. The finding of the study on the other hand supports the finding of Oluchi, Aloka and Odongo (2018) that there was a statistically significant correlation between test anxiety and chemistry academic. The finding of the study is in line with the finding of Azeem (2018) a significant and negative relationship was observed between the academic anxiety and academic achievement. Sumaila, Asiya and Syed (2019) finding that there is a significant negative correlation on test anxiety and academic performance (academic scores) of students accounting achievement supports the finding of the study. The finding of the study is also in line with the finding of Olisaemeka and Solarin (2019) that a statistically significant negative relationship existed between test anxiety and academic performance.

## **Conclusion**

The study concluded that test anxiety is a significant predictor of achievement in biology. Thus, students with high debilitating test anxiety may not do well academically in biology but those with high facilitating test anxiety may improve achievement in biology.

## **Recommendations**

The following recommendations are made in the light of the findings of the study:

1. Teachers of biology should inform students of the need to prepare for their tests by starting to read ahead of time to cover all the broad areas before the test time in order to reduce debilitating test anxiety while increasing facilitating test anxiety.
2. Effort should be made by students to study hard for tests and examinations by ensuring read, make notes of important points and seek help from other students from whom they can learn those concepts they find difficult.

## **References**

- Ali, M.S. and Mohsin, M.N. (2013). Relationship of test anxiety with students' achievement in science. *International Journal of Educational Science and Research (IJESR)*, 3(1), 99-106.
- Anakwe, A.I. and Dikko, S. (2017). An overview of resilience and academic achievement of adolescents in Nigeria. *KIU Journal of Humanities*, 2(2B), 95-101.
- Azeem, M.D.A. (2018). Study of academic anxiety and academic achievement among secondary school students. *International Journal of Research in Social Sciences*, 8(3), 147-161.
- Ebulum, G.C. and Chidiobi, R.U. (2016). Resilience, gender and age as predictors of satisfaction with academic major among university undergraduates. *International Journal of Research in Engineering and Social Sciences*, 6 (04), 13-23.
- Eman, D., Hind, A.G, Rufa, M., Nadiah, A. and Brouj, A. (2016). Relationship between test anxiety and academic achievement among undergraduate nursing students. *Journal of Education and Practice*, 7(2), 57-65.
- Melnick, H. & Darling-Hammond, L. (2020) *Reopening Schools in the Context of COVID-19: Health and Safety Guidelines from other Countries*. Washington: Learning Policy Institute.
- Olisaemeka, B. and Solarin, F. (2019). Test anxiety and academic performance of students in Lagos secondary schools. *International Journal of Recent Scientific Research*, 10(3), 31258-31261. Doi: <http://dx.doi.org/10.24327/ijrsr.2019.1003.3224> On 16 August, 2020.
- Oluchi, J.N., Aloka, P.J.O. and Odongo, B.C. (2018). Text anxiety belief as predictor of students' achievement in chemistry in public secondary schools in Kenya. *International Journal of Psychology and Behavioural Science*, 8(4), 70-76. Doi: 10.5923/j.ijpbs.20180804.03 On 16 August, 2020.
- Ringeisen, T, Buchwald, P. and Hodapp, V. (2010). Capturing the multidimensionality of test anxiety in cross-cultural research: An english adaptation of the german test anxiety inventory. *Cognition, Brain, Behaviour, An Interdisciplinary Journal*, 14, 347-364.
- Segool, N. K., Carlson, J. S., Goforth, A. N., Von der Embse, N. and Barterian, J. A. (2013). Heightened test anxiety among young children: Elementary school students' anxious responses to high-stakes testing. *Psychology in the Schools*, 50, 489-499. doi: 10.1007/s12310-013-9111-7 On 16 August, 2020.
- Sumaila, P., Asiya, A. and Syed, Z.S.R. (2019). Test and anxiety and academic performance among senior secondary students. *Indian Journal of Applied Research*, 9(5), 1-3.
- Udeani, U. (2012). The relationship between study habits, test anxiety and science achievement. *Journal of Education and Practice*, 2(3), 151-157.
- Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C. and Booy. R. (2020). School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. *The Lancet Child & Adolescent Health*, 4(5), 397-404.