



Emotional Intelligence and Cognitive Test Anxiety as Correlates of Academic Achievement Among Secondary School Biology Students

Loretta, N. Nworgu & Tochukwu, C. Udem

Department of Science Education, Faculty of Education
University of Nigeria, Nsukka.

Abstract

This study determined the relationship between emotional intelligence and cognitive test anxiety as correlate of academic achievement among Biology students in Agbani education zone of Enugu state. This study was a correlation survey research design. Four research questions and four hypotheses was formulated to guide the Study; Hypotheses were tested at 0.05 level of significance. The population consist of 3126 students and sample of 360 senior secondary 11 Biology students were selected. The sample was drawn using multistage sampling technique. Three instruments were used for data collection namely; Emotional Intelligence Scale(EIS), Cognitive Test Anxiety scale(CTAS) and Biology Achievement Test(BAT). These instruments were trial tested. The reliability coefficient of EIS and CTAS was established using Cronbach alpha while BAT was established using Kudder Richardson test. Index of 0.75 was estimated for EIS, 0.82 for CTAS. Whereas 0.83 for BAT. The result was analyzed using Pearson product moment correlation coefficient and regression analysis. The findings revealed that there's low and positive correlation between emotional intelligence, cognitive test anxiety and achievement of students in Biology. There is low and positive correlation between emotional intelligence, cognitive test anxiety and students' achievement in Biology as moderated by gender. Based on the finding, these conclusion was made; increase in emotional intelligence, increases academic achievement while increase in cognitive test anxiety decreases the level of academic achievement students can attain, therefore teachers should ensure to enhance emotional intelligence of the students and inversely prepare them for any test without fear.

Keywords: Academic achievement, Emotional intelligence, cognitive test anxiety and gender.

Introduction

The end product of every education institution lies with the result the students emerged with. That is to say that every student is expected to graduate with a good result at the end of every academic year. In West African Senior Secondary Certificate Examinations, students offered up to minimum of seven subjects and maximum of nine subjects and its expected that the students obtained a credit pass in each subject, which will guarantee the students' admission into the tertiary institution. According to Stern and Schneider (2010), achievement is defined as a way student grasps knowledge in certain skills. Academic achievement is the fulfilling of goals set by students and this is an individual duty; students can determine to score A's in all the subjects offered in school or score less than that. Adeyemi and Bolariwa (2013), emphasized use of grades in examinations and reported that grades could serve as predictive and criterion measures.

Achievement is used in testing the retention of information, skills and equally a determinant of the efficacy and efficiency of a given instruction (kabutu, Oloyede & Ogunsola-Bande, 2015). Achievement is an outcome of an experience which one gains through exposure to education; student's good result shows that the student has learnt well during the learning process and test is an excellent tool in the hand of the teacher to ascertain the extent the student has learnt the subject taught. If a good foundation is laid at secondary level, students can better cope with the challenges of life and profession with great ease according to Kpolovie, Igho & Okoto (2014). There are a lot of factors that may attribute to high or low academic achievement of students in secondary school level and some of such factors maybe psychological constructs like emotional intelligence and cognitive anxiety towards testing situation.



Emotional intelligence is a variable that has clear impact on students' lives; it influences one's thought, relationships and emotions. It is a psychological construct that described a personal understanding of oneself, others, emotions and response to situations. It motivates student to perform, help to display behavior like perseverance, intentionality, creativity, compassion, integrity and persistence in the classroom learning. These emotions help students in rational decision making, social interaction and conflict resolution in the school and every other aspect of life. According to Adigwe (2015), emotional intelligence is an individual's ability to perceive, integrate and understand emotion in a manner that enable one to facilitate thought-process, promote personal growth and development. For a student to be emotional intelligence means being able to recognize emotions; the reason for one's action, for associating with others within the school and outside the school environment as well as the ability to solve problems arising from the emotional expressions. Emotional intelligence is important in improving academic success, health, social and psychological wellbeing of students in school setting; the introduction of emotional intelligence in the school may result to massive success and reduce a lot of problems such as drug abuse, cultism, school violence, under-achievement and other school vices.

Studies on emotional intelligence yielded mixed results. Kashani, Azimi & Vaziri (2012), investigated the use of emotional intelligence and its relationship to academic achievement, the results indicated that there is no relationship between emotional intelligence and academic achievement. Elhaj (2015), revealed there was a significant positive relationship between Emotional intelligence and achievement. In addition, Oyewunmi, Osinbajo and Adeniji (2016), reported that there is a significant relationship between emotional intelligence and students' academic performance; emotional intelligence predicts students learning outcome.

Another construct that affects academic achievement is cognitive test anxiety. Traditionally, cognitive test anxiety has been conceptualized as a multidimensional construct consisting of two broad dimensions, which are: emotionality(affective) and worry(cognitive). Emotionality is a construct that is characterized by the physiological reactions to evaluation situations; such as shivering, dizziness. Breath palpitation, tension, sweating on the palms, feeling sick and so on. These reactions take place on hearing of examination or test and students with high

emotionality performs low during testing situations whereas Worry (cognitive), focuses on distracting thoughts, self-deprecating rumination and other distracting thoughts as related to test. Worry is composed of individual's cognitive reactions to evaluative situations. It is also an internal dialogue regarding evaluation; during or after the test. Thoughts that are usually entertained by students experiencing high levels cognitive test anxiety are; comparison of oneself performance to another student, lack of confidence in the performance considering the consequences of failure, unpreparedness for the test(feeling), much worry over the test and so forth. Ergene (2011), opined that cognitive test anxiety is referred to as the type of performance anxiety resulting from fear of failure in an academic evaluation setting. Also, Cassady (2010), see test anxiety as a pervasive form of academic anxiety that generally has a negative impact on patterns of beliefs and behaviours common to testing situations. Studies of Rizwan and Nasir (2010), found significant negative relationship exists between test anxiety scores and students' achievement scores and that cognitive factor (worry) contributes more in test anxiety than affective factors (emotional). Also, Das, Haldar and Mishra (2014), study on academic achievement and cognitive test anxiety of secondary school level students, revealed that high test anxiety is an obstacle in the path of academic achievement and decreases the academic efforts and motivation of the students with respect to achievement. From the studies above on both variables, its observed that emotional intelligence and cognitive test anxiety maybe one of the contributing factors to academic achievement of students in Biology. Therefore, the need to find solution to this problem that had been consistently result to students' poor achievement in Biology. Hence, the need for this study, was to determine the relationship existing among emotional intelligence and cognitive test anxiety in enhancing students' interest and academic achievement in Biology.

Research Questions

The following research questions guided the study:

1. what is the relationship between Emotional intelligence and academic achievement of students in Biology?
2. what is the relationship between Cognitive test anxiety and academic achievement of students in Biology?



3. what is the relationship between Emotional intelligence and academic achievement in Biology as moderated by gender?
4. what is the relationship between Cognitive test anxiety and academic achievement in Biology as moderated by gender?

Materials and Method

Research design

Correlation survey research design was adopted in this study. A correlation study, as noted by Nworgu (2015), seeks to establish what relationship exists between two or more variables. Also, Borden and Abbott (2008) stated that in correlation research, the main interest is to determine whether two or more variables co-vary and if so, to establish the direction, magnitude and forms of the observed relationship. The use of correlation survey design is justified because the study established relationship between emotional intelligence, cognitive test anxiety and academic achievement among secondary school Biology students.

Participants

The population of this study comprised of 3126 students which includes all the co-educational and single sex schools of senior secondary two (SS2) students in Agbani zone, making up to 45 government owned secondary schools in Agbani Education Zone (PPSMB, Enugu south zone 2020/2021 session). The schools include four Girls School, three boys' school and thirty-five co-educational schools. Three hundred and sixty students (360) were selected using multi-stage sampling technique. In stage one, simple random sampling technique with replacement was used to select two Local Government Area (Enugu South and Nkanu West) out of the three Local Government Area in Agbani Education zone; stage two; purposive sampling technique was used to select only 13 co-educational schools from the two L.G.A (six schools in Enugu South and seven schools in Nkanu West). Lastly, in stage three, proportionate stratified random sampling technique was used to choose 40% of the total population of SS2 students (male and female) in each of the 13 co-educational schools. Proportionate stratified random sampling method was considered suitable for the study because of the heterogeneous nature of the number of students in the 13 co-educational schools as some have large number of students while others have not too large number. That is, the proportionate stratified random sampling technique was adopted to

ensure that each co-educational schools on the population participated in the study in the same proportion as they existed in the population.

Instruments

The instruments: emotional intelligence scale was adapted from Shutte et al, cognitive test anxiety scale adapted from Cassady and Johnson. Emotional intelligence scale with 15 items, had responses on a 4-point likert scale that ranged from Strongly Agreed (SA), Agree (A), Disagreed (D) and Strongly Disagreed (SD). Cognitive test anxiety scale was a 15 items and the responses to the CTAS range on a four point likert-type scale from Always, Sometimes, Rarely and Never. Finally, Biology achievement test was adapted by the researcher which covers some topics from Biology curriculum; regulation of internal environment, nervous system, respiration and extra. It consists of 30 items multiple choice questions with four options A-D, each correct answer was awarded (1) mark while EIS and CTAS was awarded (2) marks while incorrect answer zero (0).

Validation and Reliability of Instrument

Face and content validation was carried out on the three instruments (EIS, CTAS and BAT) by four experts. Factor analysis was also carried out on EIS and CTAS with principal axis factoring based on varimax rotation; 15 items out of 33 item scale survived on Emotional intelligence scale while 15 item out of 27 items scale survived on cognitive test anxiety scale. The instruments were later subjected to a trial testing and internal consistency reliability of Cronbach alpha of Emotional intelligence scale was estimated as 0.75, the reliability of estimate of Cognitive test anxiety scale was 0.82 and reliability estimate of 0.83 was established for Biology Achievement Test (BAT) using Kuder Richardson (K-R20).

Analysis of Data

The instruments were shared to 360 students and copies of the instruments administered were collected on the spot, the students' response was scored by the researcher and out of 360 SS2 students for the study, only 355 completed the exercise and were retrieved, given a return rate of 99% which were found useful and used for the analysis. SPSS version 23 was used to analyze the collected data, Pearson's Product Moment correlation coefficient was used to analyze data related to the research questions 1 to 4 while regression ANOVA and Hayes process macro was used



to test hypothesis 5-8. For the research questions, the coefficient (r) and the size of the relationship was interpreted using the interpretation of a correlation

coefficient by Nwana (as cited by Nworgu, 2015), which ranges from 0.00 - 0.09 (very low) – 0.80-1.00 (very high).

Results

Table 1: Pearson Product Moment Correlation Analysis of the Relationship between Emotional Intelligence and Academic Achievement of Students in Biology

Variables	N	Mean	SD	R	R ²
Emotional Intelligence	355	47.80	6.96	0.30	0.09
Academic Achievement	355	18.28	8.39		

KEY: N = Number of respondents, R = Correlation coefficient, R² = Coefficient of determination

Table 1 shows the relationship between emotional intelligence and academic achievement of students in Biology. The result indicates that the correlation coefficient (R) obtained between emotional intelligence and academic achievement of students in Biology was 0.30. This shows that there is a low and positive correlation between emotional intelligence and academic achievement of students in Biology.

Furthermore, the coefficient of determination associated with the correlation coefficient of 0.30 was 0.09. This coefficient of determination shows that 9% variation in students’ academic achievement in Biology is accounted for by students’ emotional intelligence. This implies that 91% variation in students’ academic achievement in Biology is attributed to other variables order than emotional intelligence.

Hypothesis 1

H0₂: There is no significant relationship between emotional intelligence and academic achievement of students in Biology.

Table 2: Regression ANOVA test of the Relationship between Emotional Intelligence and Academic Achievement of Students in Biology.

Model	Sum of Squares	Df	Mean Square	F	Sig.	Dec.
Regression	8025.375	1	8025.375	35.178	0.00	S
Residual	80531.36	353	228.134			
Total	88556.73	354				

α = 0.05, S = Significance

Result in Table 2 shows that an f-ratio of (F(1, 354) = 35.178, p = 0.00) was obtained for the relationship between emotional intelligence and academic achievement of students in Biology. Since the associated probability (p) value of 0.00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis one (H0₁) is therefore rejected.

Hence, inference drawn is that the relationship between emotional intelligence and academic achievement of students in Biology is statistically significant. This implies that emotional intelligence is a significant factor in determining students’ academic achievement in Biology.



Table 3: Pearson Product Moment Correlation Analysis of the Relationship between Cognitive Test Anxiety and Academic Achievement of Students in Biology

Variables	N	Mean	SD	R	R ²
Cognitive Test Anxiety	355	35.09	13.42	0.39	0.15
Academic Achievement	355	18.28	8.39		

KEY: N = Number of respondents, R = Correlation coefficient, R^2 = Coefficient of determination

Table 3 result shows the relationship between cognitive test anxiety and academic achievement of students in Biology. This indicates that the correlation coefficient (R) obtained was 0.39. This means that there is a low and positive correlation between cognitive test anxiety and academic achievement of students in Biology. Furthermore, the coefficient of determination

associated with the correlation coefficient of 0.39 was 0.15. This shows that 15% variation in students' academic achievement in Biology is accounted for by students' cognitive test anxiety. This implies that 85% variation in students' academic achievement in biology is attributed to other variables order than cognitive test anxiety.

Hypothesis two

H0₂: There is no significant relationship between cognitive test anxiety and academic achievement of students in Biology.

Table 4: Regression ANOVA test of the Relationship between Cognitive Test Anxiety and Academic Achievement of Students in Biology.

Model	Sum of Squares	D f	Mean Square	F	Sig.	Dec.
1 Regression	8752.317	1	8752.317	63.503	0.00	S
1 Residual	48652.545	353	137.826			
Total	57404.862	354				

$\alpha = 0.05$, S = Significance

Result in Table 4 shows that an f-ratio of ($F(1, 354) = 63.503$, $p = 0.00$) was obtained for the relationship between cognitive test anxiety and academic achievement of students in Biology. Since the associated probability (p) value of 0.00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis one (HO4) is therefore rejected.

Hence, inference drawn is that the relationship between cognitive test anxiety and academic achievement of students in Biology is statistically significant. This implies that cognitive test anxiety is a significant factor in determining students' academic achievement in Biology.

Table 5: Regression Analysis of the Relationship between Emotional Intelligence and Academic Achievement in Biology as Moderated by Gender

R	R ²	MSE	F	df1	df2	P	Dec.
0.33	0.11	223.728	14.9411	3.00	351.00	0.00	S

KEY: R = Correlation coefficient, R^2 = Coefficient of determination

The relationship between emotional intelligence and academic achievement in Biology as moderated by gender, indicates that the correlation coefficient (R) obtain was 0.33. This shows that there is a low and positive correlation between emotional intelligence and academic achievement in Biology as

moderated by gender. Furthermore, the coefficient of determination associated with the correlation coefficient of 0.33 was 0.11. This means that 11% variation in students' academic achievement in Biology is attributed to emotional intelligence as moderated by gender.



Hypothesis three:

H0₃: There is no significant relationship between emotional intelligence and academic achievement in Biology as moderated by gender.

Result in Table 5 shows that an f-ratio of ($F(3, 351) = 14.9411, p = 0.00$) was obtained for the relationship between emotional intelligence and academic achievement in Biology as moderated by gender. Since the associated probability (p) value of 0.00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis three ($H0_3$) is

rejected. Hence, inference drawn is that the relationship between emotional intelligence and academic achievement in Biology as moderated by gender is statistically significant. This implies that gender is a significant moderator of the relationship between emotional intelligence and students' academic achievement in Biology.

Table 6: Regression Analysis of the Relationship between Cognitive Test Anxiety and Academic Achievement in Biology as Moderated by Gender

R	R ²	MSE	F	df1	df2	P	Dec.
0.31	0.09	227.850	12.553	3.00	351.00	0.00	S

KEY: R = Correlation coefficient, R^2 = Coefficient of determination

The result indicates that the correlation coefficient (R) obtained between cognitive test anxiety and academic achievement in Biology as moderated by gender was 0.31. This shows that there is a low and positive correlation between cognitive test anxiety and academic achievement in Biology as moderated by gender. Furthermore, the coefficient of determination associated with the correlation coefficient of 0.31 was 0.09. This means that 9% variation in students' academic achievement in Biology is attributed to cognitive test anxiety as moderated by gender.

Hypothesis four:

H0₄: There is no significant relationship between cognitive test anxiety and academic achievement in Biology as moderated by gender.

Result in Table 6 shows that an f-ratio of ($F(3, 351) = 12.553, p = 0.00$) was obtained for the significant relationship between cognitive test anxiety and academic achievement in Biology as moderated by gender. Since the associated probability (p) value of 0.00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis four ($H0_4$) is rejected. Hence, inference drawn is that the relationship between cognitive test anxiety and students' academic achievement in Biology as moderated by gender is statistically significant. Also, gender is a significant moderator of the relationship between cognitive test anxiety and students' academic achievement in Biology.

Discussion

The findings of the study revealed that correlation coefficient (R) obtained between emotional intelligence and academic achievement of students in Biology was 0.30. This means that the variation in student's academic achievement in Biology was accounted for by students' emotional intelligence. The result also revealed that the relationship between emotional intelligence and academic achievement of students in Biology is statistically significant. This implied that emotional intelligence is a significant factor in determining student's academic achievement in Biology. This finding answered the research question two; which encourages students to study hard to attain good result especially, when considered the consequences of failure in termly examination or repeating a class. However, the findings agree with the studies of Ogundokun and Adeyemo (2010) and Ejomah (2014) which revealed that emotional intelligence shares relationship with academic achievement of students. These studies agreed with the present study even though it employed different research design and carried out in different education zone but it all geared towards academic achievement. Finally, the study by Onyeukwu (2013), contradicts with the findings of the present study; the study indicated that there is low and positive relationship between emotional intelligence and academic achievement in Biology. Also revealed that there is no significant relationship between emotional intelligence and academic achievement of students in Biology, this is because the reviewed study only studied emotional intelligence and academic achievement with comparison to school ownership type and gender, it



was carried out in different region of Nigeria whereas the present study extends the study to two dependent variables (emotional intelligence and cognitive test anxiety) and one independent variable on Biology students in Agbani education zone of Enugu state.

The result on cognitive test anxiety and academic achievement of students in Biology showed that there is a low and positive correlation between the two variables because the coefficient of determination (R) obtained showed that the variation in students' academic achievement in Biology is accounted for by student's cognitive test anxiety. This implies that cognitive test anxiety is a significant factor in determining students' academic achievement in Biology. The result of the study agrees with the findings of many researchers such as Cassady and Ronald (2002), the study revealed that academic achievement is affected by test anxiety. David, Connor and Wendy (2010), found out that cognitive distortions (worry and body symptoms) mediated the relationship between cognitive test anxiety and academic achievement. This is to say that when the students worry much about examination, it inversely prevents the quest to study hard. Both study adopted correlation survey design and their different results emphasized that cognitive test anxiety affects achievement of students. In contrary, the study by Olatoye (2019), revealed a negative significant relationship between test anxiety and science achievement. This study revealed that there is no correlation between the variables as cognitive test anxiety does not enhance academic achievement of students in science subjects, though it adopted an ex-post factor design for the design which is different from the design used in the present study.

Finally, there is low and positive correlation between emotional intelligence, cognitive test anxiety and academic achievement in Biology as moderated by gender. This means that decrease in emotional intelligence and increase in cognitive test anxiety, affect the scores of students in Biology Achievement Test as moderated by gender. The result also revealed that there is no significant relationship between emotional intelligence and academic achievement in Biology as moderated by gender. Hence, the inference drawn from the analysis was that the relationship between emotional intelligence and academic achievement in Biology as moderated by gender is statistically significant. Study by Onyeukwu (2013), revealed that there is low and positive relationship between emotional intelligence and academic achievement in Biology, there is no significant influence of SS2 Biology students'

emotional intelligence and academic achievement. Chukwu (2014), reported that interactive effect of emotional intelligence and gender influenced students' achievement in problem solving in Chemistry, which is attributed to gender stereotyping. The result further revealed that the relationship between cognitive test anxiety and academic achievement as moderated by gender is statistically significant. These findings agreed with the study of Cassady and Johnson (2001), which showed that cognitive test anxiety have negative impact on students' academic achievement. Bethel-Eke and Ikpa (2019), revealed that cognitive test anxiety affects academic achievement of students. Obviously, from the findings above, it is inferred that cognitive test anxiety is attributed to poor academic achievement in Biology.

Conclusion

Based on the findings and discussion of this study, the collated results of the studies showed that in general; increase in emotional intelligence increased academic achievement of students, also increase in cognitive anxiety towards test have a negative impact on students' academic achievement in Biology. In other words, high cognitive anxiety test, less the level of academic achievement among secondary school Biology students.

Recommendation

Based on the findings of this study, the following recommendations were made;

1. Biology teachers should ensure that Biology contents meant to be taught were properly done using teaching materials with right procedure and ensure active involvement of the students in the learning process; which may help to improve emotional intelligence and reduce cognitive test anxiety during examinations because there will be massive retention and assimilation.
2. Students should avoid any form of unnecessary pressure by attending classes, reading ahead of time, carry out assignment and engaging in class activities in other to reduce any form of anxiety towards test situation.

Reference

Adeyemi, T.O., & Bolarinwa, R. (2013). Principals' leadership styles and student academic performance in secondary schools in Ekiti state, Nigeria. *Journal of political science*. Corpus ID:157040397



- Adigwe J. C. (2015). Emotional Intelligence and Problem Solving Achievement of Chemistry Students. *ATBU, Journal of Science, Technology & Education (JOSTE)*; 3(1), 34-40.
- Bethel-Eke, O. A & Ikpa, A. I (2017). Evaluation of cognitive test anxiety and academic performance of students in public secondary schools in River state. *International journal of innovative education research*. 5(4): 7-15,2017.
- Cassady, J.C (2010). *Anxiety in schools. The causes, consequences and solutions for academic anxieties*. New York: Peter lang.
- Cassady, J.C. & Johnson, R.E. (2001). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology*, 27, 270-295.2002.
<http://doi.org/10.1006/ceps.2001.1094>.
- Chukwu, L.O. (2014). Relationship among test anxiety, academic achievement and interest of senior secondary school students in Geometry in Enugu State. From university of Nigeria, Nsukka. Retrieved October 2016 from file:///D:/%C2AO/anxietychukwu-LINDA O.pdf
- Das, S. K., Halder, U.K., & Mishra, B. (2014). A Study on test anxiety and academic achievement on secondary level school students. *Online Indian Streams Research Journal, International Recognized Multidisciplinary Research Journal*, 4(6),76-88
- David, W., Connors, L., & Wendy, S (2010). Do cognitive distortions mediate the test anxiety – examination performance relationship? *Educational psychology: An International Journal of Experimental Educational Psychology*, 30:1, 11-26.
- Ejomah, D.S (2014). Emotional intelligence and locus of control as prediction of academic achievement among secondary school students in Lagos Metropolis.
- Elhaj, N. (2015). The relationship between emotional intelligence and English language achievements among private secondary schools' students at Khartoum locality. *The Ahfad Journal*, 32(1), 15-29.
- Ergene, T. (2011). The relationships test anxiety, study habits, achievement motivation, and academic performance among Turkish High school students. *Research Project, Hacettepe University, Beytepe, Ankara*. From: <http://www.examanxietyresearches>
- Kashani, L., Azimi, L. & Varziri, S. (2012). Relationship between emotional intelligence and educational achievement. *Procedia Social and Behavioral Sciences*, 69, 1270-1275.
- Kpolovie , Igho & Okoto (2014). Academic achievement prediction: Role of interest in learning and attitude towards school. *International of humanities, social sciences and education (IJHSSE)*. Vol 1, issue 11, pp73-74. ISSN2349-0381.
- Ogundokun, M. O. & Adeyemo, D. A. (2010). Emotional intelligence and academic achievement: the moderating influence of age, intrinsic and extrinsic motivation. *The African Symposium: An online journal of the African Educational Research network*. 10(2), 127-141.
- Rizwan, A. R., & Ahmad, N. (2010). Relationship between Test Anxiety and Academic Achievement of Students at the Post Graduate Level. *Bulletin of Education and Research*. 32(2), 63- 74, 2010.
- Scheinder, M & Stern, E. (2010). The cognitive perspective of learning: *10 cornerstone findings*.