

COGNITIVE TEST ANXIETY AND LEARNING OUTCOMES OF SELECTED UNDERGRADUATE STUDENTS

by

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Abstract

This study investigated the level of Cognitive Test Anxiety of selected undergraduate students. It also sought to find out whether CTA of students vary by ability (performance) levels and sex. A total of 92 purposively selected undergraduate students completed the 27-items Cognitive Test Anxiety Scale. Data were analyzed using contingency table and t-test. Results showed that students CTA was generally low. It was also discovered that CTA negatively affects performance levels; the higher the level of students' CTA, the lower the level of students learning outcome and vice-versa. However, sex differences do not lead to corresponding differences in CTA and performance levels.

Keywords: Test Anxiety, Cognitive test, Learning Outcomes, students' performance.

Introduction

Successful learning in school subjects/courses is popularly measured by the level of students' performance in cognitive tests. This performance is expressed in terms of student's Cumulative Grade Point Average (CGPA). It is commonly advised that teachers should give series of opportunities to learners to express their true abilities by administering series of tests or any other assessment technique rather than a one-short version of either test or examination. In doing this however, a number of students experience some disruptions in their physical or emotional state. The disruption in the individual '...creates anxiety and interferes with learning' (Sax, 1980). Anxiety as described by Olatoye (2007) is 'an emotional component of human beings that manifests itself in life endeavours in form of worry and restlessness'. Olatoye posited further that when this condition manifests during testing session, it is referred to as test anxiety.

Research into the prevalence, and impact of test anxiety began in Yale University in the United State of America (Hembree, 1988) when students were asked to respond to a Test Anxiety Questionnaire constructed by Sarason and Mandler (1952). From the outcome of the analyses of the test anxiety data collected, students were categorized as being '...high- or low-test-anxious. Those found to be low-test-anxious did better than the high-test-anxious in a test given during an experiment where block design was employed.

Research interest on Cognitive Test Anxiety (CTA) became popular after the pioneer effort of Sarason and Mandler. Most of these researches found two distinct aspects of CTA. These two are what Liebert and Morris (1967) termed 'worry' (any cognitive expression of concern about one's own performance) and 'emotionality' (autonomic reaction to the test situation) (Hembree, 1988; p.48). The work of Liebert and Morris shifted CTA theory towards a cognitive orientation. Thus, Wine (1971) propounded 'Attentional theory' to describe how CTA impedes performance in cognitive tests. The theory states that 'test

anxious persons divide their attention between task-relevant activities and preoccupations with worry, self-criticism, and somatic concerns. With less attention available for task-directed efforts, their performance is depressed'. Many other researches confirmed the two-factor structure for CTA for quite some time (Sarason, 1978; Spielberger, Gonzalez, et. Al., 1980; Ware, Gallasi & Dew, 1990 and Ferrando, Varea & Lorenzo, 1999).

Further research on the construct showed that TA could be multidimensional in nature. For instance, Furlan and Cassady (2009) reported that Valero Aguayo (1999) produced Test Anxiety Questionnaire with four subscales. These were '... behavioral, cognitive and physiological symptoms and anxious situations. Furlan and Cassady stated further that three-factor model of CTA were arrived at by Ferrando, Varea & Lorenzo (1999). These are worry, emotionality and facilitating anxiety. The third factor on the Performance and Anxiety Questionnaire by Ferrando et. al. is indicative of the notion that there is a measure of anxiety required for success in any given task. This will arouse the determination to succeed in the individual.

CTA causes poor performance in cognitive tasks (Cassady, 2004; Cassady, Mohammed & Mathieu, 2004 and Olatoye, 2007). It was found to have correlated negatively with performance scores in cognitive tests (Spielberger 1972; Adigwe, 1997 and Zoller & Ben-Chain, 2007). Findings from literature also revealed that CTA level is, to a large extent, dependent on the type of test or examination administered. Where the preferred item format is used to conduct tests, students demonstrate low CTA level and this in turn leads to high score in cognitive tests Olatoye (2007).

Looking at the influence of students' sex on CTA scores, most literature reviewed reported that female students have consistently showed high CTA in most cognitive test situation (Hembree, 1988; Razor and Razor, 1998; Olatoye and Afuwape, 2003). However, Jerrel, Cassady and Johnson (2002) reported that there was gender differences in TA, but the differences were not related to performance on examinations. In the same vein, Olatoye (2007) reported that there was no significant difference in CTA level of male and female students.

Hembree (1988) conducted a meta analysis of researches on CTA. He posited that CTA could be caused by series of factors. These include ability level, sex, school grade level, ethnicity, birth order and school environment. He also reported that '...CTA was greater for students of average ability than for those with high ability. He stated further that CTA was greater for low-ability than average-ability students with the same proportion for which it was higher between average-ability and high-ability students. The questions now are that 'does CTA level reported for the various ability levels of students by different researchers remained unaltered?' Is there any difference between CTA level of male and female students? How is CTA level related to students' performance in their study?

The objectives of the present study were to:

- i. investigate the CTA level of students
- ii. find out the difference in the CTA level of undergraduate students by ability levels
- iii. examine gender differences in CTA levels of undergraduate students

Arising from the three objectives listed, one research question and two null

hypotheses were raised as listed below:

Research Question 1: What is the level of Cognitive Test Anxiety (CTA) of the students?

Hypotheses 1: There is no significant difference in the academic performance of students with high and low CTA.

Hypothesis 2: There is no significant difference in the CTA of male and female students.

Methods

A total of 113 undergraduate Education students were purposively selected to complete the Cognitive Test Anxiety Scale (Furlan, Cassady and Perez, 2009). The students were those in 300 level of Education/Economics program in Obafemi Awolowo University. They were purposively selected because of the ease with which their Cumulative Grade Point average (CGPA) could be obtained from the database of the software that the Obafemi Awolowo University is using to process students' results (Ife Students Information Service – ISIS). The sample consisted of 77 males and 36 females with an average age of 24.07 years. They all responded to the 27 items on the Cognitive Test Anxiety Scale (CTAS). The CTAS is a 27-item instrument developed by Cassady and Johnson (2002). The scale has '...psychometric and theoretical evidence identifying' it '...to be a reliable and valid measurement tool for examining Cognitive Test Anxiety...'. There were 44 items on the initial version of the instrument which, through factor and reliability analyses were reduced to 27 items. Furlan et.al. (2009) reported that the CTAS has an internal consistency reliability coefficient of 0.91 and test-retest reliability coefficients ranging between 0.88 and 0.94 over repeated administrations. The response format on the CTAS is a four-point Likert-type scale from "Always" to "Never". The score range obtainable by any respondent to the CTAS falls between 27 and 108. Anyone whose Cognitive Test Anxiety (CTA) score ranges between 27 and 68 has CTA and anyone whose CTA score ranges between 69 and 108 has high CTA. Only 92 students consisting of 67 males and 25 females (with an average age of 24 years) completed all the items on the CTAS and only the 92 cases were involved in data analyses. Data were analysed using the Statistical Products and Service Solutions (SPSS)

Results

Test Anxiety Level of Students

The level of test anxiety of the selected students was obtained through the responses of 92 students to the CTAS. The mean CTAS score of the sample was 63.33. The minimum CTA was 29 while the maximum CTA was 89. Incidentally, the highest CTA score belonged to a male while the lowest CTA was recorded for a female student. Both students with the lowest and the highest CTA had a CGPA of 3.00. Thus, there may not be enough basis for anyone to infer that CTA influences performance.

Hypotheses 1: There is no significant difference in the CTA level of students belonging to different ability levels. The performances of the selected students which are expressed in terms of CGPA were subjected to t-test. The students were grouped into two categories of 'Low' and 'High' CTA levels. Their CGPA was then used for the t-test analysis, using the CTA levels as grouping variables.

The contingency table presenting the CTA of students belonging to the different

ability levels is presented below:

Table 1: Contingency Table of CTA by Performance Level

Performance Level	CTA Level		Total
	Low	High	
Pass	1 (100%)	-	1
Third Class	4 (50%)	4 (50%)	8
Second Class Lower	22 (59.46%)	15 (40.54%)	37
Second Class Upper	33 (75%)	11 (25%)	44
First Class	2 (100%)	-	2
Grand Total	62 (67.39%)	30 (32.61%)	92

The information in Table 1 shows that the higher the level of students' performance, the lower the proportion of those having high CTA. This means that CTA reduces with increase in performance. This information was further subjected to t-test analysis so as to check whether the difference in the mean CTA score of students in the 'Low' and 'High' CTA groups was significant or not significant. The result of the t-test is presented in Table 2.

Table 2: t-test result of students performance and CTA scores

TA Score	N	Mean CGPA	Std. Dev.	t _{cal}	t _{tab}
Low	62	3.50	0.74	1.71	1.70
High	30	3.23	0.67		

Note: P<0.05: Result Significant.

From Table 1, the mean CGPA of those with 'low' CTA was 3.50 (which falls within the range of Second Class Upper Division) while those belonging to the 'high' CTA group have a mean CTA of 3.23 (which falls within the range of Second Class Lower Division). The performance of students with high CTA was poorer than those belonging to the Low CTA level. In confirmation of a significant difference in the performance of students in the two CTA groups, the t-test yielded a significant difference between the two groups ($t [df=29] = 1.71; p < 0.05$). This means that CTA level affects students' undergraduate student's performance negatively. The higher the level of CTA of students, the lower the level of students' academic performance. It therefore means that there is a significant difference in the CTA level of students belonging to different ability levels.

Hypothesis 2: There is no significant difference in the CTA of male and female students. The mean CTA score of male and female students were subjected to t-test analyses. The result is as presented in Table 2.

Table 3: t-test analysis of mean CTA score of male and female students.

Sex	N	CTA Score	S. D.	t _{cal}	t _{tab}	p
Male	67	63.78	12.14	0.58	1.71	>0.05
Female	25	62.12	12.14			

Note: P>0.05 – Result Not Significant.

The CTA score of male students (63.78) here was higher than that of female students (62.12), nonetheless, both of them fall within the low CTA range (27-68). The result of t-test analysis of the two group means showed no significant difference in the CTA level of male and

female students ($t [df=24]=] = 0.58; p>0.05$). This means that there is no significant difference in the CTA of male and female students.

Discussion

The level of CTA of students involved in this study was generally low. About 63% of the total sample had low CTA. It is generally believed that cognitive test anxiety has a negative relationship with performance level. Thus, it was expected that the performance of the majority of those included in this study would be high, so as to confirm the evidence in literature (Tryon, 1980; Adigwe, 1997, Olatoye, 2007 and Zoller & Ben-Chain, 2007). The result in the present study aligned with the evidence from literature that the higher the level of CTA, the lower the performance of students and vice-versa.

The relationship found between students' sex and CTA level was such that most of the time, female students showed higher CTA than their male counterparts (Hembree, 1986; Razor and Razor, 1998; Olatoye and Afuwape, 2003). Looking at the findings of the present study, sex differences do not necessarily lead to differences in CTA level. This finding was in agreement of the submission of Jerrel, Cassady & Johnson (2002) and Olatoye (2007) that reported that sex differences do not mean significant difference in CTA and performance in cognitive tests.

Conclusion

The CTA of students have a negative relationship with the level of their performance in cognitive activities in the school. The higher the CTA level, the poorer the performance of students. In addition, sex differences do not mean differences in the level of academic performance.

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