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# Effects Of Cognitive Behaviour Therapy On Anxiety And Performance Of Business Mathematics Students In Colleges Of Education In Yobe State

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## ABSTRACT

The research proposal has four specific objectives, four research questions. Quasi-experimental research design was used for the study. Therefore, the population of this study comprised of all NCE I business mathematics students of 2024/2025 academic session and two intact classes of 84 of Umar Suleiman college of education Gashua and federal college of education (technical) Potiskum students was used as sample for the study. The instrument for data collection were Business Mathematics Anxiety Questionnaire and Business Mathematics Achievement Test. The data collected from the study was analyzed using descriptive of mean score, standard deviation, and mean difference while independent sample t-test was used to analyze the hypothesis at 0.05 level of significance. The result of the analysis reveals that no much difference exist between the pre-treatment mean numerical anxiety of business mathematics students in experimental and control groups in Colleges of Education in Yobe state, significant difference exist between the post-treatment mean numerical anxiety of business mathematics students in experimental and control groups Colleges of Education in Yobe state. The study made some recommendations among which is Business Education lecturers should adopt CBT embedded lectures instructional strategy in Business mathematics.

**Keywords:** CBT, Anxiety, Business mathematics, Performance

## INTRODUCTION

Business mathematics is among the core courses to business education students in Tertiary Institutions in Nigeria. It has one credit unit as stipulated by National Commission for Colleges of Education (NCCE, 2014) with the course contents which include checking accounts, price discounts, markups and markdown, payroll calculation, simple and compound interest, consumer and business credit and mortgages, annuities and revenue among others. Through the knowledge of business mathematics students are expected to acquire skills and attain competencies in numerical courses such as Economics, Element of Finance, Business Statistics, Taxation and Auditing. This coincides with Adamu, Bashir and Haruna (2015) who opined that critical thinking skills and good performance in mathematics are predictors of students' performance in Accounting, Element of Finance, Economics, Taxation and Auditing. This therefore suggests that a solid foundation in business mathematics skills and knowledge will facilitate students understanding of related courses.

Despite the significance of Business Mathematics to business education students, the academic performance of students in the subject is discouraging. Studies conducted by Adamu, Bashir and Haruna (2015) revealed that the academic achievements of business education students in the subject had been relatively low over the years. The problem of students' achievement in business mathematics is not from Business Education students alone, research findings have confirmed that even mathematics students who offer the course as elective mostly found themselves completely at a loss during lectures, test and examinations (Adamu & Jibrin, 2018). Acha (2019); Morey & Taylor, (2019) reported that numerical anxiety of college students is the major factor affecting the performance in mathematics.

### **Statement of the Problem**

Numerical anxiety among students has been a global concern as international comparisons of students such as the Trends in International Mathematics and Science Study (TIMSS) indicated that students in many countries experienced mathematics anxiety (Olaoluwa, 2021). Many college students do not perform well due to anxiety they attached to numerical courses (Khanekhesi, 2016). This situation results to poor academic performance among students. Anxiety is a common disorder able to be treated effectively by Cognitive Behaviour Therapy (Watts, Marchand, Bouchard, Gosselin, Langlois, Belleville, & Dugas, 2020). The persistent poor performances of the students in the course affects their overall performance and delay their graduating period of students that failed. The unwholesome situation prompted the researchers to carry out this study.

### **Objectives of the Study**

The main objective of this study is to determine the effects of Cognitive Behaviour Therapy on anxiety and performance of colleges of education students in business mathematics in Yobe State, Nigeria. Specifically, the study seeks to: -

1. Determine the difference between the pre-treatment mean anxieties of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
2. Ascertain the difference between the pre-test mean performances of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
3. Find out the difference between the post treatment mean anxiety of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
4. Determine the difference between the post-test mean performances of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.

### **Research Questions**

1. What is the difference between the pre-treatment mean anxieties of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
2. What is the difference between the pre-test mean performances of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
3. What is the difference between the post-treatment mean anxieties of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
4. What is the difference between the post-test mean performances of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.

### Research Hypothesis

The following null hypotheses are developed and tested at 0.05 level of significance

1. There is no significant difference between the pre-treatment mean anxiety of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
2. There is no significant difference between the pre-test mean performance of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
3. There is no significant difference between the post treatment mean anxiety of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.
4. There is no significant difference between the post-test mean performance of Business Mathematics students in Cognitive Behaviour Therapy embedded lectures of anxiety and those in conventional group in Colleges of Education in Yobe state Nigeria.

### LITERATURE REVIEW

This research will build on the Cognitive Behavioral Therapy (CBT) as an anxiety therapy theory being developed by Aaron Beck in 1960. It is a form of psychotherapy originally known as “cognitive therapy”. Beck developed this form of psychotherapy with intent to focus on problems and to modify dysfunctional (inaccurate or unhelpful) thinking and behaviours. Treatment, overall, is based on a cognitive formulation that beliefs and behaviour strategies characterize a specific disorder..

According to (Heather, 2021) Anxiety generally involves worry, fear, and rumination about the future. Such anticipatory anxiety makes enjoying each moment a difficult endeavor. Unfortunately, the author maintained that anxiety disorders represent a serious and prevalent problem for children and adults worldwide. The lifetime prevalence rate for anxiety disorders is estimated at 33.7% of the population an estimate that has remained quite stable over the years (Bandelow & Michaelis, 2015). Overall, anxiety disorders represent the most common psychiatric disorders within the general population and the number one mental disorder among women (Heather, 2021).

Richard S., Anja M., Anne F. W. & Linda W. (2020), posited that academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university. School systems mostly define cognitive goals that either apply across multiple subject areas (e.g., critical thinking) or include the acquisition of knowledge and understanding in a specific intellectual domain (e.g., numeracy, literacy, science, history).

Choudhury Choudhury, S. & Sharma, M. (2020) premised that anxiety is considered to be a major predictor of the student’s academic success. They continued that there are numerous factors that have been found in the extant literature, which shows a negative relationship between anxiety level and academic achievement. The students with higher level of anxiety performed poorly in both school performance, test performance and lacked long term orientation towards achieving career goals (Alam, 2017).

Although anxiety covers a range of areas and may be debilitating, there is good news: It is highly treatable. Despite the enormous stressors to which we are subjected to in modern society, there are ways to respond without succumbing to serious anxiety problems. Rebuilding such tranquility is possible thanks to a number of psychological treatment approaches. This research focuses on the non-pharmaceutical

Approaches that have been found effective for reducing and even curing individuals of anxiety disorders and associated symptomatology (Heather, 2021).

Effect of Cognitive Behaviour Therapy on Numerical Anxiety Students. Nikpour, Kargozar and Ghribzadeh (2021) opined that Cognitive behavioral therapy is considered as one of the treatment methods to reduce students' numerical anxiety. This treatment is designed to address spontaneous negative thoughts and assumptions and beliefs in emotional disorders. According to this method,

individuals are taught how to review and evaluate their negative thoughts. The therapist encourages clients to evaluate their negative thoughts and hypotheses in a real and objective way through behavioral assignments. According to cognitive behavioral therapy, maladaptive thoughts are the cause of maladaptive behavior and people must learn new ways of thinking. Therapists are able to help people rebuild their thought patterns to better cope with anxiety (Mohebbi, Mazlom, Kasraei, et. al, 2018).

## METHODOLOGY

This research will be conducted at the three colleges of education in Yobe state, Nigeria. The design of the study quasi-experimental design specifically non-equivalent control group design to examine the effects of cognitive behaviour therapy embedded lectures on anxiety and performance of business mathematics students in Yobe state Colleges of Education. In non-equivalent control group design, a researcher uses existing classrooms in the selected schools for a study rather than creating classroom groups through random selection and random assignment (Sambo, 2015). The author further stated that quasi-experimental design lacks the key component of a true experimental design that is, randomization. In addition, Enemali (2015) stated that in quasi-experimental design the researcher deals with class as an intact group. Since school authorities would not allow the researcher to disrupt normal school setting for the purpose of creating the groups through randomization, the study therefore used the intact existing classrooms for the study. The Population of this study will include all 408 NCE I students offering business mathematics in three (3) colleges of education in Yobe state. A sample of two intact classes of 84 students from two colleges of education will be randomly selected.

Two instruments will be used for data collection. Business Mathematics Anxiety Questionnaire (BMAQ) adapted from Suinn and Winston, (2015) and Business Mathematics Achievement Test (BMAT) adapted from Aliyu (2021). The BMAQ will be divided into Pre-treatment and Post-treatment. The Pre-treatment will be used to measure the level of anxiety of Business Mathematics students in both Experimental and Control groups prior to the treatment, while the Post-treatment will be used to measure the level of anxiety of the students in both experimental and control groups after the treatment. The BMAT will also be divided into Pre-test, Post-test. The Pre-test will be used to determine the level of academic performance of students involved in the study prior to the treatment. The Post-test will be used to determine the academic performance of students after treatment. The Pre-test, Post-test achievement test which contain 30 multiple choice questions each will be adapted from Aliyu (2021).

Descriptive statistics of mean score, standard deviation and mean difference will be used to analyze the research questions. The data collected will enter into Statistical Package for Social Science (SPSS), 25. The package will be used to run the mean score, standard deviation and mean difference. The decision rule will be based on mean difference. In the analysis, a mean difference score of less than 5 (<5) in performance test and less than 0.5 (<0.5). The hypotheses will be tested using *an independent Sample t-test* at 0.05 level of significance. In the analysis when the p- value is found to be equal or less than the alpha ( $\leq 0.05$ ), the hypothesis will be rejected. While if the p-value is greater than the alpha value of 0.05 ( $P > \alpha$ ) the null hypothesis will be retained.

## RESULTS

**Research Question One:** *What is the difference between the pre-treatment mean anxiety of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria?*

**Table 1:** Descriptive statistics on pre-treatment mean anxiety of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	Mean Difference	Remark
Experimental	47	2.81	.851	0.30	Trivial
Control	37	2.51	.932		

Source: Fieldwork, 2026

The descriptive statistics used to answer research question presented in Table 1 revealed the pre-treatment mean anxiety of 2.81 with the standard deviation of .851 for 47 students in the experimental group. The students in the control group had 2.51 with the standard deviation of .932. The mean difference was 0.30 which was found to be under the scale of trivial, it was therefore concluded that there was trivial mean difference between the pre-treatment mean anxiety of business mathematics students in experimental and control groups in Colleges of Education in Yobe state.

**Research Question Two:** *What is the difference between the pretest mean performances of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria?*

**Table 2:** Descriptive statistics on pre-test mean performance of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	Mean Difference	Remark
Experimental	47	32.32	7.62	0.19	Trivial
Control	37	32.51	6.66		

Source: Fieldwork, 2026

The pre-test mean performance of the 47 students in experimental group documented in Table 2 was 32.32 with the standard deviation of 7.62. The students in control group had the mean of score 32.51 with the standard deviation of 6.66. The mean difference between the two groups of students was 0.19 in favour of students in control group. The mean difference was found to be under the scale of trivial, hence it was concluded that there was a trivial difference between the pre-test mean performance of students in the experimental and control groups in Colleges of Education in Yobe state.

**Research Question Three:** *What is the difference between the post treatment mean anxieties of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria?*

**Table 3:** Descriptive statistics on post-treatment mean anxiety of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	Mean Difference	Remark
Experimental	47	1.74	.706	0.64	LD
Control	37	2.38	1.01		

Source: Fieldwork, 2026

The post-treatment mean anxiety of students in experimental and control groups stood at 1.74 and 2.38 with the standard deviation of .706 and 1.01 respectively. The mean difference was 0.64 on 4-point scale in favour of students in experimental group. The mean difference obtained was under the scale of large difference. It was therefore concluded that there was large difference between the post-treatment mean anxiety of business mathematics students in experimental and control groups in Colleges of Education in Yobe state

**Research Question Four:** *What is the difference between the posttest mean performances of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria?*

**Table 4:** Descriptive statistics on post-test mean performance of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	Mean Difference	Remark
Experimental	47	51.70	12.80	21.08	LD
Control	37	30.62	10.10		

Source: Fieldwork, 2026

Analysis of difference between the post-test mean performance of students in experimental and control groups in Colleges of Education in Yobe state is as presented in Table 4. From the Table, the mean scores were 51.70 and 30.62 for students in experimental and control groups with standard deviations of 12.80 and 10.10 respectively. The mean difference was 21.08 which falls under the benchmark of Large Difference (LD) in favour of students in experimental group.

**Test of Null Hypotheses**

The research hypotheses were tested using *Independent sample t-test* at 0.05 level of significance.

**HO<sub>1</sub>:** There is no significant difference between the pre-treatment mean anxiety of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria.

**Table 5:** *Independent t-test* on pre-treatment mean anxiety of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	T	p-value	Remark
Experimental	47	2.81	.851	-1.497	.139	H <sub>01</sub> retained
Control	37	2.51	.932			

Source: *Fieldwork, 2026*

The result of *Independent t-test* used to test null hypothesis one presented in Table 5 disclosed the mean score of 2.81 with standard deviation of .851 for students in experimental groups. Students in the control group was 2.51 with the standard deviation of .932. The t-value was -1.497 with  $p=.139$ . The p-value obtained was found to be greater than 0.05, the result suggested that there was no significant difference between the pre-treatment mean anxiety of business mathematics students in experimental and control groups in Colleges of Education in Yobe state. The null hypothesis was retained.

**HO<sub>2</sub>:** There is no significant difference between the pretest mean performance of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria.

**Table 6:** *Independent t-test* on pre-test mean performance of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	T	p-value	Remark
Experimental	47	32.32	7.62	-.118	.907	H <sub>02</sub> retained
Control	37	32.51	6.66			

Source: *Fieldwork, 2026*

The result in the test of null hypothesis two in Table 6 revealed the mean difference of 32.32 and 32.51 with standard deviations of 7.62 and 6.66 for students in experimental and control group respectively. The  $t=-.118$  and  $p=.907$ . The obtained p-value obtained was greater than the level of significance ( $.907>0.05$ ), the result suggested that no significant difference between the pre-test mean performance of students in the experimental and control groups Colleges of Education in Yobe state. The hypothesis was retained.

**Hypotheses Three:** There is no significant difference between the post treatment mean anxiety of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria.

**Table 7:** *Independent t-test* on post-treatment mean anxiety of students in experimental and control groups

Grouping	N	Mean	Std. Deviation	T	p-value	Remark
Experimental	47	1.74	.706	3.244	.002	H <sub>03</sub> rejected
Control	37	2.38	1.01			

Source: *Fieldwork, 2026*

The result of *Independent t-test* used to test null hypothesis one presented in Table 7 disclosed the mean score of 1.74 with standard deviation of .706 for students in experimental groups. Students in the control group was 2.38 with the standard deviation of 1.01. The t-value was 3.244 with  $p=.002$ . The p-value obtained was found to be less than 0.05, the result suggested that there was significant difference between the post-treatment mean anxiety of business mathematics students in experimental and control groups Colleges of Education in Yobe state. The null hypothesis was rejected.

**Hypotheses Four:** There is no significant difference between the posttest mean performance of business mathematics students exposed to Cognitive Behaviour Therapy embedded lectures and those exposed conventional lectures method in Colleges of Education in Yobe state Nigeria.

**Table 8: Independent t-test on post-test mean performance of students in experimental and control groups**

Grouping	N	Mean	Std. Deviation	T	p-value	Remark
Experimental	47	51.70	12.80	-8.44	.000	H0 <sub>4</sub> rejected
Control	37	30.62	10.10			

Source: Fieldwork, 2026

The finding of test of null hypothesis two presented in Table 8 disclosed the mean difference of 51.70 and 30.62 with standard deviations of 12.80 and 10.10 for students in experimental and control group respectively. The  $t = -8.44$  and  $p = .000$ . The obtained p-value obtained was less than the level of significance ( $.000 > 0.05$ ), the result suggested that there was significant difference between the post-test mean performance of students in the experimental and control groups Colleges of Education in Yobe state. The hypothesis was rejected.

### DISCUSSION OF THE FINDINGS

From the data analysis, the following are the summery of the major findings:

1. The result of research question one which was further affirmed by the test of corresponding null hypothesis one shows no much difference exist between the pre-treatment mean numerical anxiety of business mathematics students in experimental and control groups in Colleges of Education in Yobe state. The finding therefore indicated that the two groups of the students that were involved in the study had the same mean academic achievement before the treatment. The outcome was the same with the submission of Inuwa (2018) who reported that financial accounting achievement among secondary school had no significant difference between the pre-test mean achievement score of cooperative learning students and conventional approach students.
2. The result of research question two and null hypothesis two revealed that there was no significant difference between the pre-test mean performance of business mathematics students in cognitive behaviour therapy embedded lectures on anxiety and those on conventional group in Colleges of Education in Yobe State.
3. The findings of research question three and test of corresponding null hypothesis suggested that significant difference exist between the post-treatment mean numerical anxiety of business mathematics students in experimental and control groups Colleges of Education in Yobe state. The result is in agreement with that. Nikpour, Kargozar and Ghribzadeh (2021) who reported that Cognitive behavioural therapy is considered as one of the treatment methods to reduce students' numerical anxiety.
4. The outcome of research question four and test of corresponding null hypothesis suggested that there was significant difference between the post-test mean academic achievement of students in experimental and control groups Colleges of Education in Yobe state. The findings was found to be similar with that of Fayowole, (2018) who posited that many students are blocked from professional and technical job opportunities because they fear or perform poorly in Mathematics. Fayowole added that most of these adults are brain capable of learning more Mathematics; it is not a failure of intellect, but of nerve.

### CONCLUSION

The outcome of the study suggested the CBT embedded lecturers reduces anxiety and increase the academic performance of students in Business mathematics. Going by the outcome of the study, it therefore means that apart from cognitive factor, none cognitive factors from students also affect their performance in Business mathematics in Colleges of Education in Yobe state. The study therefore concluded that adopting CBT integrated lecturers would help to reducing the anxiety level of students and increase their performance business mathematics which have been one of the major problems affecting the CGPA and graduation of business education students in Colleges of Education in Yobe state.

## RECOMMENDATIONS

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

- i. On entrance, college counseling units should organize counseling intervention orientation to newly admitted business education students; this would help them to remove fear and worry that would affect them in business mathematics.
- ii. Business Education lecturers should adopt CBT embedded lectures instructional strategy in Business mathematics.
- iii. Business mathematics lecturers should create enabling environment that would motive student to actively participate in classroom interaction to business education students.
- iv. Head of Business Education programme should organize special training sessions on how to integrate CBT in instructional delivery so as to improve the pedagogical skills of business mathematics lecturers.

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