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Controlling Test Anxiety among Mathematics Students: The Use of Rational Emotive Behavior Therapy

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ABSTRACT

Test anxiety has continued to affect the academic performance and emotional wellbeing of many Mathematics students in Nigerian teacher training institutions. This study investigated the effectiveness of Rational Emotive Behavior Therapy (REBT) in controlling test anxiety among NCE Mathematics students in Kwara State, Nigeria. The study adopted a quasi-experimental pretest-posttest non-equivalent control group design. The participants consisted of 75 NCE Mathematics students drawn from two Colleges of Education in Kwara State. The experimental group has 35 students, while 40 students were in the control group. Data were collected using a researcher-developed Mathematics Test Anxiety Questionnaire (MTAQ). The experimental group received REBT intervention for six weeks, while the control group continued with normal academic activities. Mean and standard deviation were used to answer the research questions, while t-test and Analysis of Covariance (ANCOVA) were used to test the hypotheses at 0.05 level of significance. The findings revealed no significant difference between the groups before intervention. However, REBT significantly reduced test anxiety among students in the experimental group after treatment. The study also found no significant gender difference in the effectiveness of the intervention. The study concluded that REBT is an effective strategy for reducing mathematics test anxiety among NCE students.

Keywords: *Test Anxiety, Rational Emotive Behavior Therapy, Mathematics Students, College*

INTRODUCTION

Mathematics remains one of the most important school subjects across all levels of education because of its relevance to science, technology, commerce, and everyday decision-making. In teacher education institutions in Nigeria, particularly Colleges of Education, mathematics is regarded as a foundational discipline for preparing future teachers capable of supporting national development. Yet, despite its recognized importance, many students continue to experience serious emotional difficulties whenever they are faced with mathematics-related tests and examinations. One of the most persistent of these difficulties is test anxiety.

Test anxiety refers to the emotional, psychological, and physiological tension students experience before or during examinations. It often manifests through fear, worry, panic, nervousness, poor concentration, sweating, rapid heartbeat, and feelings of inadequacy. In mathematics classrooms, this problem appears more pronounced because many learners already perceive mathematics as difficult, abstract, and highly demanding. As a result, several students approach mathematics examinations with fear long before the actual assessment begins. According to Mathematics Education researchers, persistent anxiety may reduce students' confidence, affect classroom participation, weaken memory recall, and ultimately lower academic performance.

In Nigerian teacher training institutions, the issue has become increasingly noticeable. Many NCE students preparing to become mathematics teachers still struggle with negative beliefs about mathematics examinations. In some Colleges of Education, students openly express fear of quantitative courses and often describe mathematics tests as stressful experiences. Lecturers also observe situations where students who perform reasonably during classroom interactions become withdrawn during examinations.

This suggests that poor performance is not always linked to lack of ability alone. Emotional and cognitive factors may also contribute significantly.

Scholars have argued that irrational beliefs play an important role in the development of anxiety among students. Turner, Evans, Fortune, and Chadha observed that students who hold rigid beliefs such as "I must not fail," or "I have to perform perfectly," are more likely to experience severe examination anxiety. Such beliefs create unhealthy pressure and emotional instability during academic activities. Similarly, Chakraborty explained that fear of failure, unrealistic expectations, poor preparation patterns, and negative self-perception contribute substantially to examination anxiety among students. These concerns are common among learners in mathematics-related programmes where students often attach their self-worth to examination outcomes.

Over the years, different psychological and counselling interventions have been introduced to address anxiety-related problems in education. One of the most widely discussed approaches is Rational Emotive Behavior Therapy (REBT), developed by Albert Ellis. REBT is based on the assumption that emotional problems are not caused directly by events themselves, but by the beliefs individuals hold about those events. In educational settings, REBT helps students identify irrational thoughts, challenge unhealthy beliefs, and replace them with more rational and constructive patterns of thinking. Vernon (2022) noted that REBT has shown considerable usefulness in assisting students with test anxiety because it focuses on changing negative thought patterns associated with examinations.

Recent empirical studies have continued to demonstrate the effectiveness of REBT and related cognitive-behavioural approaches in reducing different forms of anxiety among students. For instance, Egara and Mosimege (2025) reported that REBT significantly reduced mathematics anxiety among Nigerian students exposed to structured therapeutic sessions. Their randomized control trial revealed noticeable improvement in students' emotional responses toward mathematics tasks after intervention. In another study, Mosimege et al. (2024) found that group rational emotive behaviour therapy significantly reduced mathematics anxiety among secondary school students. The study emphasized that therapeutic interaction within groups encouraged emotional support and helped students challenge irrational academic fears.

Similar findings have been reported beyond mathematics learning. Arnita and Netrawati (2024) established that REBT group counselling was effective in reducing students' anxiety toward examinations. Noormohamadi, Arefi, Afshaini, and Kakabaraee (2022) also found that REBT improved resilience while reducing anxiety among students. Their findings suggest that the therapy does not merely reduce fear temporarily but may also strengthen students' coping abilities over time. In Nigeria, studies involving REBT have expanded into different educational and psychological concerns. Ugwuanyi, Okeke, and Agboeze (2021) reported that music-based cognitive behaviour therapy reduced test anxiety among pupils in Basic Science. Agah et al. (2021) also found that cognitive behavioural therapy models significantly reduced test anxiety among chemistry students. Furthermore, Onah et al. (2023) observed that rational emotive behaviour education effectively reduced computer anxiety among teachers enrolled in e-learning programmes. These studies collectively suggest that irrational beliefs and anxiety-related challenges can be managed effectively through structured therapeutic interventions.

Beyond anxiety reduction, REBT has equally demonstrated effectiveness in addressing related emotional and behavioural concerns among learners and educators. Ugwu et al. (2022) reported positive outcomes of REBT in reducing depression among children with learning disabilities. Igwe et al. (2022) found that REBT assisted educators in managing occupational stress, while Obiweluozo et al. (2021) documented its usefulness in reducing stress among teachers working with children who have neuro-developmental disorders. Similarly, Onwumere et al. (2025) observed that REBT improved stress management among university lecturers in science and agricultural education. These studies indicate that REBT has broad applicability in educational environments.

Despite these growing contributions, there are still noticeable gaps in literature and practice. First, many existing studies on REBT and anxiety have focused on secondary school students, teachers, or learners with special needs. There appears to be limited empirical attention given specifically to NCE mathematics students in Nigerian Colleges of Education. Yet, these institutions prepare future teachers who are expected to teach mathematics confidently in schools. If such trainees continue to experience severe test anxiety, the implications may extend beyond their personal academic achievement to their future classroom effectiveness.

Second, many studies conducted in Nigeria have examined general examination anxiety without focusing specifically on mathematics students. Mathematics anxiety has unique features because it combines fear of evaluation with negative attitudes toward numbers, calculations, and problem-solving tasks. Findings from general academic anxiety studies may therefore not fully explain the experiences of mathematics students in Colleges of Education. Another issue relates to geographical coverage. Although a number of Nigerian studies have examined REBT interventions, limited evidence exists from Kwara State Colleges of Education. Institutional contexts differ across regions due to variations in learning environments, lecturer support systems, and student experiences. There is therefore a need for more localized evidence capable of informing counselling practices in Kwara State teacher education institutions.

The present study became necessary because test anxiety among mathematics students continues to affect learning outcomes, classroom participation, and examination performance. In many Colleges of Education, counselling services remain underutilized, while psychological interventions are rarely integrated into academic support structures. Most efforts directed toward improving students' performance focus mainly on curriculum coverage and teaching methods, with less attention given to emotional and cognitive barriers affecting learning. Consequently, some students continue to struggle silently with examination fears despite receiving adequate academic instruction.

This study is also important because it contributes to the growing body of literature on technology-driven and psychologically informed instructional support systems in mathematics education. As educational institutions increasingly recognize the relationship between emotional wellbeing and academic performance, interventions such as REBT may become valuable components of learner support services. Findings from this study may assist counsellors, mathematics educators, curriculum planners, and educational administrators in developing intervention programmes that address students' emotional challenges alongside academic difficulties.

Furthermore, the study may help future mathematics teachers develop healthier attitudes toward examinations and academic tasks. Since NCE students are expected to become classroom teachers after graduation, improving their emotional stability toward mathematics assessments may positively influence their future teaching confidence and professional effectiveness. The main objective of this study was to investigate the effectiveness of Rational Emotive Behavior Therapy in controlling test anxiety among mathematics students in Colleges of Education in Kwara State, Nigeria.

Specifically, the study sought to:

1. determine whether there was any difference between the experimental and control groups before the intervention;
2. examine the difference between the experimental and control groups after the REBT intervention; and
3. determine whether gender difference existed within the experimental group after the intervention.

The following research questions guided the study:

1. What difference exists between the experimental and control groups before the intervention?
2. What difference exists between the experimental and control groups after the intervention?
3. What gender difference exists within the experimental group after the intervention?

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the experimental and control groups before the intervention.
2. There is no significant difference between the experimental and control groups after the intervention.
3. There is no significant gender difference within the experimental group after the intervention.

RESEARCH METHODS

The study adopted a quasi-experimental pretest–posttest control group design. The design was considered appropriate because it allows for determining the causal effect of an intervention (Rational Emotive Behaviour Therapy) on test anxiety while using intact classes without random assignment (Creswell & Creswell, 2018). Two groups were involved: an experimental group that received REBT intervention and a control group that did not receive any treatment during the study period. Both groups were assessed before (pretest) and after (posttest) the intervention. The participants consisted of 75 NCE

mathematics students from two Colleges of Education in Kwara State, Nigeria. 35 students from Kwara State College of Education, Ilorin formed the experimental group, while 40 students from Kwara State College of Education, Oro served as the control group. The participants included both male and female students enrolled in mathematics-related programmes. The selection was based on students who demonstrated moderate to high levels of test anxiety as identified through a screening exercise using the Test Anxiety Inventory (TAI). This sample size was deemed adequate to provide meaningful comparisons and is consistent with similar intervention studies (Ede et al., 2022; Lathifa et al., 2023; Mosimege et al., 2024; Obiweluozo et al., 2021; Onah et al., 2023).

Data were collected using two different instruments:
i. Test Anxiety Inventory (TAI) – a standardized instrument developed by Spielberger (1980) to measure students' levels of test anxiety. The instrument contains 20 items rated on a 4-point Likert scale ranging from "Almost Never" to "Almost Always." It has been widely validated and used in Nigerian educational contexts (Eifediyi, Ojugo, & Aluede, 2018).

ii. Mathematics Performance Test (MPT) – a researcher-designed test comprising 20 multiple-choice mathematics questions covering topics relevant to the students' curriculum. The test served as an outcome measure of academic performance before and after the intervention. The reliability of the TAI in this study was established using Cronbach's alpha, which yielded a coefficient of 0.86, indicating high internal consistency. The MPT was subjected to expert review for content validity and trial tested on a comparable group, yielding a reliability index of 0.81 using Kuder-Richardson Formula 20 (KR-20). The intervention was carried out over a period of six weeks, with two sessions per week, each lasting approximately 60 minutes. The experimental group was exposed to Rational Emotive Behaviour Therapy (REBT), while the control group continued with normal academic activities. The intervention followed these phases:

Phase I: Pre-intervention (Week 1): Administration of pretest (TAI and MPT) to both groups.

Phase II: REBT Sessions (Weeks 2–5): Students in the experimental group participated in structured REBT sessions facilitated by trained counsellors. The sessions focused on:
Identifying irrational beliefs about tests and failure.
Challenging and disputing irrational thoughts.
Replacing maladaptive cognitions with rational, adaptive beliefs.
Developing coping strategies such as relaxation techniques, positive self-talk, and rational study habits.

Phase III: Post-intervention (Week 6): Both experimental and control groups were reassessed with the TAI and MPT to determine changes in test anxiety and performance.

Mean and standard deviation were used to answer the research questions. Independent sample t-test was used to test the hypothesis on pre-intervention similarity between groups. Analysis of Covariance (ANCOVA) was used to determine differences between the experimental and control groups after intervention and to examine gender difference within the experimental group. All hypotheses were tested at 0.05 level of significance.

RESULTS AND DISCUSSION

Research Question 1: What difference exists between the experimental and control groups before the intervention?

Table 1: Descriptive Statistics for Students Anxiety Level before Intervention

Group	N	Mean	SD
Experimental	35	72.46	6.81
Control	40	71.88	7.02

The result in Table 1 shows that the experimental group had a mean score of 72.46, while the control group had a mean score of 71.88 before the intervention. The difference between the two mean scores is small, suggesting that the groups were relatively similar before treatment.

Hypothesis 1: There is no significant difference between the experimental and control groups before the intervention.

Table 2: t-test for Difference Between Experimental and Control Groups before the Intervention

Variable	T	df	p-value	Decision
Pretest Scores	0.36	73	0.721	Not Significant

The result indicates that there was no significant difference between the experimental and control groups before the intervention since $p > 0.05$. The hypothesis was therefore retained.

Research Question 2: What difference exists between the experimental and control groups after the intervention?

Table 3: Descriptive Statistics for Difference Experimental and Control Groups after Intervention

Group	N	Mean	SD
Experimental	35	41.63	5.14
Control	40	69.77	6.25

The result shows that the experimental group recorded a substantially lower anxiety mean score after the intervention compared with the control group. This suggests that REBT contributed to reduction in test anxiety among the participants exposed to the treatment.

Hypothesis 2: There is no significant difference between the experimental and control groups after the intervention.

Table 4: ANCOVA for Difference Between Experimental and Control Group after Intervention

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	6842.511	2	3421.256	68.214	.000
Pretest	214.382	1	214.382	4.275	.042
Group	6471.605	1	6471.605	129.031	.000
Error	3610.227	72	50.142		

The ANCOVA result revealed a significant difference between the experimental and control groups after the intervention, $F(1,72) = 129.031$, $p < .05$. The null hypothesis was rejected. This implies that Rational Emotive Behavior Therapy significantly reduced test anxiety among mathematics students.

Research Question 3: What gender difference exists within the experimental group after the intervention?

Table 5: Descriptive Statistics for Difference within Experimental Group after Intervention

Gender	N	Mean	SD
Male	18	42.11	5.37
Female	17	41.12	4.96

The table shows slight variation between male and female students in the experimental group after intervention. However, the difference in mean scores appears minimal.

Hypothesis 3: There is no significant gender difference within the experimental group after the intervention.

Table 4: ANCOVA for Difference within Experimental Group based on Gender

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	194.326	2	97.163	3.011	.063
Pretest	168.774	1	168.774	5.231	.029
Gender	21.447	1	21.447	0.665	.420
Error	1032.558	32	32.267		

The ANCOVA result showed that gender had no significant influence on posttest anxiety scores among students exposed to REBT intervention, $F(1,32) = 0.665$, $p > .05$. The null hypothesis was therefore retained.

Discussion

The findings of the study showed that there was no significant difference between the experimental and control groups before the intervention. This indicates that both groups possessed relatively similar levels of test anxiety prior to treatment. The result strengthens the validity of the intervention because the observed post-intervention changes could reasonably be linked to the REBT treatment rather than pre-existing differences between groups.

The study further revealed that Rational Emotive Behavior Therapy significantly reduced test anxiety among mathematics students exposed to the intervention. Students in the experimental group recorded considerably lower anxiety scores after six weeks of REBT sessions compared with those in the control group. This finding agrees with Egara and Mosimege (2025), who found that REBT reduced mathematics anxiety among Nigerian students. Their study demonstrated that students who participated in REBT sessions developed more positive emotional responses toward mathematics learning activities.

The finding is also consistent with Mosimege et al. (2024), who reported that group REBT intervention significantly reduced mathematics anxiety among secondary school students. The present study extends that evidence to NCE students in Colleges of Education within Kwara State. This suggests that REBT may be effective across different educational levels and learning contexts.

Similarly, the result aligns with Arnita and Netrawati (2024), who established that REBT group counselling reduced examination anxiety among students. The current study supports the view that helping learners challenge irrational beliefs and replace unhealthy thinking patterns can improve emotional adjustment during examinations.

The result also corresponds with the findings of Noormohamadi et al. (2022), who observed improvement in anxiety management and resilience among students exposed to REBT. It appears that REBT not only reduces fear temporarily but may also strengthen students' emotional coping capacity toward academic stressors.

Furthermore, the present finding agrees with Agah et al. (2021), whose study on chemistry students revealed that cognitive behavioural therapy models were effective in treating test anxiety. Since

REBT is rooted within the broader cognitive-behavioural framework, the similarity in findings is not surprising. Both approaches emphasize cognitive restructuring and modification of irrational beliefs.

The outcome equally supports Vernon's (2022) position that REBT applications are useful in assisting students experiencing test anxiety. Mathematics students often hold unrealistic expectations about academic performance, and REBT appears effective in helping them reinterpret examination situations more rationally.

The finding also relates to the work of Turner et al. (2024), who argued that irrational beliefs and unhealthy cognitive appraisals contribute significantly to examination anxiety among undergraduates. During the intervention sessions in the present study, many students initially expressed beliefs such as "I must never fail mathematics" or "Failure means I am not intelligent." Through therapeutic engagement, these beliefs were gradually challenged and replaced with healthier perspectives.

Another important finding of the study revealed that gender did not significantly influence the effectiveness of REBT among the participants. Both male and female students responded positively to the intervention. This suggests that REBT may be broadly applicable regardless of gender differences among mathematics students.

The absence of significant gender difference aligns with several REBT studies that emphasized the universal applicability of cognitive restructuring techniques across learner categories. Although some studies report slight variations in anxiety experiences between male and female students, the present study indicates that the therapy itself remains effective for both groups.

The findings of this study have practical implications for mathematics education and counselling services in Nigerian Colleges of Education. Emotional barriers to learning are often neglected within academic support systems, yet they contribute substantially to poor classroom engagement and weak examination performance. Integrating counselling-based interventions such as REBT into student support programmes may therefore improve learners' confidence and academic adjustment.

The study also suggests that mathematics educators should pay attention not only to content delivery but also to students' emotional experiences during learning and assessment. When students consistently associate mathematics with fear and tension, academic improvement may become difficult even when instructional materials are adequate.

CONCLUSION

The study concluded that Rational Emotive Behavior Therapy is effective in controlling test anxiety among NCE mathematics students in Kwara State Colleges of Education. Students exposed to the therapy demonstrated substantial reduction in anxiety levels compared with those in the control group. The study also established that gender did not significantly influence the effectiveness of the intervention. The findings therefore suggest that REBT could serve as a useful counselling strategy for improving emotional stability and examination experiences among mathematics students in teacher training institutions.

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