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RATIONAL EMOTIVE BEHAVIORAL THERAPY (REBT) AS AN ANTIDOTE TO MATHEMATICAL ANXIETY

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Abstract:
This study investigated the effectiveness of Rational Emotive Behaviour Therapy (REBT) as an antidote to mathematics examination anxiety of secondary school students in Bamenda III subdivision. The study adopted the pre-test–post-test, control group, quasi-experimental study design. The instrument used was the Cameroonian version of Spielberger's Test Anxiety Inventory. Students with scores ≥51 were considered to be test anxious. A total of 160 test anxious students were assigned to the experimental and control groups. The Experimental group was exposed to seven weeks training in the REBT, while participants in the control group were trained in Health Education. The result revealed a significant effect of therapy in the reduction of examination anxiety ($F = 53.465$; $p < .000$). The result suggested that the REBT treatment approach was a fruitful antidote in reducing examination anxiety of the students. It was therefore recommended that school counsellors in Cameroon should continuously update their skills in the use of the REBT to assist secondary school students to overcome their mathematics exam anxiety disorders.

Keywords: mathematics, examination anxiety, rational emotive behavioral therapy, antidote, students

1. Introduction

Mathematics has been utilized from the moment of creation of the universe and is still being used today in all spheres of life. Every day we get engaged in mathematical application consciously or unconsciously while engaging in buying, selling, cooking and other business involvements like banking, and micro financing. There is hardly a day that one can get on without doing some mathematics, even the aged persons do a lot of mathematics in their counting of the days of the week for farming and market days in the week in the African setting. Mathematics is undisputedly a requirement for survival in life. In fact, mathematics is indispensable for everyone. These realities and other notions

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have made the decision makers in most countries to make mathematics a compulsory subject at all levels of education. In Cameroon, mathematics is compulsory for every candidate at the ordinary level and it is expected to be included on the time table every day. The government policy on the objectives of mathematics is to ensure that all citizens who attain the secondary level of education can function well in the society in their various activities even if they drop out from school at that level. These objectives are not actually realized due to the fact that many students perform poorly in mathematics because of lack of interest, phobia, poor instructional strategies, and even poor assessment strategies employed in the subject. Despite these challenges bordering the teaching and learning of mathematics, it still remains a compulsory subject in most educational systems due to its importance in various spheres of life. One of the most prominent challenges that many students face in mathematics is anxiety. West (2022) reported that mathematics anxiety describes the fear or worry about performing math calculations. And that a person with math anxiety may feel panicked at the thought of working with numbers, making it harder to think. According to Olango (2016), maths anxiety consists of an affective, behavioral and cognitive response to a perceived threat to self-esteem that occurs as a response to situations involving mathematics. Mathematics anxiety can be experienced at all levels of education from primary school to university education.

Anxiety often stems from many factors like poor impression on the part of students who are poorly informed by their peers, parents and teachers that mathematics is difficult, poor teaching methods, lack of motivation of teachers towards students and students' negative attitudes among others. In a study of the factors causing mathematics anxiety in undergraduate students, Zanabazar, Deleg & Ravdan (2023) found out that teacher-related factors have a strong negative correlation with math anxiety (β=-0.583) while family-related factors (β=-0.311) and student-related factors (β=-0.133) have weaker correlations. These authors indicated that the possible explanations for these findings included inadequate teaching and professional skills, poor communication between students and teachers, heavy task loads and outdated resources. In another study by Mehmet and Hulya (2021), participant teachers expressed 9 different student-related factors that cause students to develop fear and anxiety towards math. These factors are lack of knowledge of students from a previous class, dyscalculia, not understanding the logic of the problem, failure to grasp the importance of mathematics in daily life, afraid to answer a question wrong, being bored or afraid of reading long problem sentences, inability to read fluently, lack of concentration, not being in intelligence-enhancing environments. Teachers explained 5 different teacher-related factors that cause students to develop fear and anxiety towards math course. These factors are insufficient knowledge of effective teaching strategies, not using different methods to endear math lesson, not explaining the need of using math in daily life, not doing reinforcement activities about each topic, and not sparing sufficient time for each student. Participants stated 6 different factors related with parents that cause students to develop fear and anxiety towards math course. These factors are parents' pressure on students always to get high marks, negative statements of parents, comparison with successful students, not

being able to help their children with math at home, not allowing students to use his/her math knowledge in daily life, and crowded families.

2. Review of Literature

The nature of mathematics is such that it requires constant practice for the students to be able to internalize the concepts which many students do not practice. The tendency with most students is to accumulate work so that in the event of an assessment, they cannot comprehend the materials they have to study for the assessment because they were not consistent in their study. This has made life very difficult for many students who want to keep everything till the time of assessment.

Many researchers have carried out studies trying to seek solutions to the perennial problems of students' lack of interest and poor achievements in mathematics caused by mathematics anxiety. According to the Centre of Neuroscience in Education (2025), Mathematics Anxiety is a negative emotional reaction to mathematics that can be debilitating. It has been defined as *"a feeling of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in ordinary life and academic situations"*. The severity of Mathematics Anxiety can range from a feeling of mild tension all the way to experiencing a strong fear of maths.

Odiri (2023), in his findings, uncovered that tension and attitude were the primary concerns of students' mathematics anxiety in the mathematics learning experience. It was revealed that evaluation causes math anxiety. It was also revealed that students' math learning is influenced by cognitive, environmental and behavioral learning experiences. It was discovered that both low and high achiever students experience math anxiety. It was revealed that self-doubt and lack of confidence in students when solving equations are both causes of mathematics anxiety. Prahmana, Sutanti & Diponegoro (2020) carried out a study to investigate mathematics anxiety and the influencing factors among junior high school students in Yogyakarta, Indonesia and found that mathematics anxiety of junior secondary students is mostly manifested in cognitive symptoms and that the most significant factor influencing students' mathematics anxiety is mostly home, i.e. interaction with parents and siblings, and secondly, the classroom. Azizah, Mahmudi and Retnawati (2019) reported that students' mathematics anxiety profile tends to belong to the medium category. Estonantia and Dio (2019) explored the factors causing mathematics anxiety of senior high school students in calculus, which revealed that almost all of the participants have either high or moderate mathematics anxiety levels. This anxiety for mathematics is compounded during mathematics examinations, and some studies have shown that this anxiety is prevalent in the early years of schooling, while others reported that it increases as students go higher.

Yuliani, Suryadi and Dahlan (2019) in their study found that the mathematics anxiety of junior high school students was at a moderate level, and increased anxiety occurs in grade 8. The greatest student anxiety occurs when students are facing math tests and when completing math tasks. Students feel insecure when solving math problems, because they only memorize mathematical formulas and do not understand their

meaning. Also, the study showed that the material in mathematics textbooks cannot be understood well by students, and mathematics anxiety increases as students go to higher classes, and generally, students do not want to have a career in the future associated with mathematics. Also, it indicated that teachers have an important role in reducing the level of mathematics anxiety. Knowing about the mathematics anxiety experienced by students is the first step of the teacher to make efforts to minimize mathematics anxiety. Sometimes the negative impressions students have about the subject as being difficult and the impressions created by some teachers who make students feel that mathematics is only for some selected people are amongst the major causes of anxiety. Some strategies and interventions have been suggested and tried on how to remedy this issue of mathematics anxiety. In the study by Mehmet and Hulya, participant teachers suggested 6 different strategies to reduce and eliminate the factors that cause students to develop fear and anxiety towards mathematics. These strategies are one-to-one interaction between student and teacher, motivating students, relating math with daily life, using effective teaching strategies, testing students for dyscalculia, and in-service training to teachers. These strategies have been implemented in many classrooms, and the issue of mathematics anxiety still persists. There is a need to consider other interventions that may remedy this issue of mathematics anxiety. It is in this backdrop that the researcher investigated the effectiveness of Rational Emotive Behavioral Therapy **(**REBT) as an antidote to students' anxiety in mathematics.

Rational Emotive Behavioral Therapy (REBT) and mathematics exam anxiety are conceptually linked through the understanding that students' emotional and behavioral responses to mathematics exams are largely influenced by their thought processes. REBT, a form of cognitive-behavioral therapy developed by Albert Ellis, posits that irrational beliefs about academic performance contribute significantly to exam-related distress (Ellis, 2012). Students who believe that failure is catastrophic or that their self-worth is solely dependent on academic success tend to experience heightened levels of anxiety before and during examinations (David, Szentagotai, Eva & Macavei, 2019). In another study, Egwuonwu (2022) revealed a significant difference in the effect of Rational Emotive Behaviour Therapy (REBT) and Enhanced Thinking Skills (ETS) in reducing examination anxiety among primary school pupils ($F(1,273) = 10.031$; $p = .009 < 0.05$). REBT involves techniques such as behavioral techniques, emotional regulation and cognitive restructuring.

Behavioral techniques are structured interventions used in psychological therapy to help individuals modify maladaptive behaviors and develop healthier coping strategies. Rooted in behaviorism, these techniques focus on observable actions rather than solely on thoughts or emotions, making them practical and action-oriented (Corey, 2016). In a study by Adeyemi & Olufemi (2019) it was revealed that students who practiced role-playing exams were more confident, showed lower anxiety levels, and performed better academically than those who did not engage in such techniques. These findings suggest that gradual exposure to test conditions through behavioral techniques can help students manage their fears effectively. Another technique of REBT, which has proven to be effective in alleviating anxiety, is emotional regulation.

Emotional regulation refers to the ways in which emotional responses are monitored, evaluated, and modified by individuals in order to achieve desirable outcomes in various situations. Strategies for emotional regulation include cognitive reappraisal, suppression, mindfulness, and relaxation techniques, all of which contribute to emotional stability. Ahmed, El-Sayed, and Hassan (2020) found that students who practiced positive reframing techniques were less likely to experience overwhelming test anxiety and performed better academically. To complete the treatment, another technique that was applicable was cognitive restructuring.

Cognitive restructuring is a fundamental psychological technique used to identify, challenge, and modify irrational or maladaptive thought patterns into more rational and constructive beliefs (Beck, 2013). The process involves recognizing distorted thinking patterns, evaluating their validity, and reframing them in a way that reduces distress and enhances emotional well-being (David, Szentagotai, Eva & Macavei, 2019). In their study, Neba and Chi (2023) found that students who received cognitive restructuring training showed higher levels of self-efficacy and lower test anxiety. By shifting an individual's perspective, cognitive restructuring helps reduce anxiety, improve emotional regulation, and foster adaptive coping strategies.

2. Statement of the Problem

Exam anxiety, especially in mathematics exams, is a pervasive issue in public secondary schools across Africa, affecting the academic performance and well-being of students. As the pressure to perform well in exams grows, a significant number of students develop high levels of anxiety, leading to both emotional and physical distress. Research has shown that factors such as large class sizes, high-stakes examinations, and limited access to psychological support systems contribute to the escalation of exam-related stress. The causes of mathematics exam anxiety in African secondary schools are multifaceted. First, the highly competitive nature of the education system, where only a limited number of students are selected for higher education opportunities, leads to significant stress. It is even compounded by the fact that a pass in mathematics is a requirement to study most of the subject combinations at the advanced level, which will direct students to pursue their chosen careers in the University. Students are often bombarded with societal and family expectations, which can lead to feelings of inadequacy and fear of failure. Such are some of the causes of anxiety in many students. How can these feelings of anxiety be remedied? Therefore, the need to investigate the effectiveness of Rational Emotive Behavioral Therapy (REBT) in limiting mathematics examination anxiety of students in Bamenda III subdivision.

2.1 Research Objectives

The objective of this study was to examine the effectiveness of Rational Emotive Behavioral Therapy (REBT) in reducing mathematics exam anxiety among students in public secondary schools in Bamenda III.

2.2 Research Question

- What is the efficacy of Rational Emotive Behavioral Therapy (REBT) in reducing mathematics exam anxiety among students in public secondary schools in Bamenda III?

2.3 Research Hypotheses

The following hypotheses were formulated to guide the study at the 0.05 level of significance:

H_0: REBT has no significant effect in reducing mathematics exam anxiety among students in public secondary schools in Bamenda III.

H_a: REBT significantly helps in reducing mathematics exam anxiety among students in public secondary schools in Bamenda III.

3. Research Methodology

This study adopted a Pretest - Post-test quasi – experimental design, which involved one experimental group and one control group. Participants were pretested before treatment to identify those with exam anxiety traits. They were also post – tested after treatment to obtain the effect of treatment on the reduction of exam anxiety. The design allowed for the collection of numerical data that was analyzed statistically to determine the effectiveness of REBT in reducing exam anxiety. Data was collected using standardized questionnaires and self-report scales that measure exam anxiety, such as the Test Anxiety Inventory (TAI) or similar tools validated for use in the Cameroonian context. These instruments were validated by some experts in the field of psychology and education to review the instruments. The reliability of the instruments was established using the Cronbach alpha coefficient to obtain an index of 0.79. Statistical techniques, such as analysis of covariance, were used to test the hypotheses, and the research questions were answered using means and standard deviation.

3.1 Procedures

The research data were collected in three separate but closely linked stages, viz., pretest, intervention and post-test as described below:

3.1.1 Pretest

The researcher obtained permission to carry out this research from the principals of the sampled secondary schools used for the study. Preliminary visits were made to the two secondary schools, and through these visits, a pre-test, using the Test Anxiety Inventory (TAI) by Spielberger (1980), was administered to students to identify students who were exam anxious in the sampled schools. The identified examination anxious students constituted the experimental group, the REBT in one school and the control group in the other school.

3.1.2 Intervention

The Experimental and Control (placebo) groups were exposed to 45 minutes each of six sessions of therapy on the rational emotive behaviour therapy (REBT) for the Experimental group, and also 45 minutes each of six sessions of the Placebo Therapy (PT) for the control group. The training was conducted by professional counselors during the participants' long break period. In all, each of the students in the treatment and control groups had six contact sessions of therapy. The therapy was psycho – educational in nature. It commenced with an address by the researcher to the experimental and control groups on the reason for the programme, the rules of the programme, and the need to be themselves and feel free to discuss their concerns and ask questions when there was a need to do so. Students in the control group were not exposed to any therapy on examination anxiety, but they were exposed to health issues as the placebo therapy. The researchers employed the services of two professional counselors who assisted in the treatment programme. Training was based on the manuals developed by the researcher, which were given to the professional counselors engaged in the study. The treatments lasted for seven weeks. It was executed through a series of lectures, focus group discussions and take-home assignments.

3.1.3 Post-test

This is the evaluation of the treatment package and the entire programme. The researcher and two research assistants re-administered the test anxiety inventory (TAI) after the sessions as a post–test to determine the effectiveness of treatment therapies in reducing examination anxiety in the seventh week. To avoid the time lag effect, the study was completed within a school term. The Participants who met the criteria for the post-test were over 95.8%, giving a dropout rate of 4.2%. The Contents of the treatments in both Experimental groups were given to the counselors engaged in the study.

4. Results

4.1 Research Question

What is the efficacy of REBT in reducing mathematics exam anxiety among students in public secondary schools in Bamenda III?

Table 1: Descriptive Statistics of Students` Pretest and Post-test Mean Scores with Standard Deviation Mean Difference

Experimental groups	Pre-test			Post-test			Mean Difference
	N	Mean	Std deviation	N	Mean	Std deviation	
REBT	76	57.45	4.56	67	37.36	12.56	20 .09
Placebo control	89	57.32	4.76	93	56.57	5.76	0.75
Total	**165**	**57.41**	**4.58**	**160**	**46.84**	**14.32**	**15.32**

The data here were obtained from 160 students from the experimental group and the placebo control group. A total of 165 students (as indicated in Table 2) had an exam anxiety score > 51 from the total of 548 students who participated in the pretest

examination. The mean pretest scores with standard deviation were 57.45± 4.56 and 57.32 ± 4.76, for experimental groups, the REBT and placebo- control respectively; while a total of 160 students met the criteria for post-test had mean post-test scores with standard deviation 37.36 ± 12.56 and 56.57 ± 5.76 for experimental groups, the REBT and placebo -control group respectively. The mean difference between pretest and post-test mean scores was 20.09 and 0.75 for the REBT and control (placebo), respectively.

H_0: REBT has no significant effect on reducing mathematics exam anxiety among students in public secondary schools in Bamenda III.

To test H_o, the Analysis of Covariance (ANCOVA) was used. The result, as shown in Table 2 revealed a significant effect of Therapy in the reduction of examination anxiety ($F = 53.465$; $p < .000$). In addition, there was an overall significant difference in the mean post-test examination anxiety following exposure to Therapy. The highlighted column provides the statistical significance ($p > .000$) of whether there was a significant difference between the groups of therapy when adjusted for the co-variate (mean pretest scores). However, to show how the covariate has adjusted the original mean post-test scores of students (in the descriptive statistics), an estimate table was constructed, which revealed that the specific therapy reduced the mean post-test scores of students.

Table 2: Estimate Table Showing Mean Post-test Examination Anxiety Scores of Students Exposed to Therapy

Therapy	Mean	Std. Error	95% of Confidence Interval	
			Lower Bound	Upper Bound
Placebo Control	53.601[a]	1.406	53.145	58.371
REBT	38.103[a]	1.352	34.789	39.611

Table 2 revealed that the students exposed to the REBT had a lower mean score of 38.103 with 95% confidence interval of between 34.789 and 39.611 with a standard error of 1.352, while the control (placebo) group had a mean score of 53.601[a] with 95% confidence interval between 53.145 and 58.371 with a standard error of 1.406. To determine where the significant effect between group differences was observed, a post-hoc analysis was performed using pairwise comparison of means with least significant difference (LSD), as shown in Table 3. The rejection of the null hypothesis was further confirmed. This implied that the students exposed to the REBT benefited from the treatment packages than the students in the control group. Thus, REBT could be used in managing anxious students in secondary schools who are taking mathematics examinations.

Table 3: Pairwise comparison of the Mean Post-test Mathematics Examination Anxiety Scores of Students in the Placebo –Control and REBT

			95% confidence interval for Difference[a]			
(I)Therapy	(J) Therapy	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
Control	REBT	17.579*	1.732	.000*	13.806	22.083
REBT	Control	17.579*	1.732	.000*	-21.082	-13.905

Notes:
Based on estimated marginal means.
*The mean difference is significant at the .05 level

[a]Adjusted for multiple comparisons: Least Significant Difference (equivalent to no adjustments)
An estimate of the modified population marginal mean J
An estimate of the modified population marginal mean I
[a]Bonferroni Corrected P-Value and 95% confidence interval of the differences

4.2 Discussions of findings

The findings revealed that the reduction of mathematics examination anxiety levels of participants exposed to REBT and the control group differed significantly. The significant difference in the reduction of examination anxiety of the participants exposed to REBT could be attributed to the effectiveness of the therapy. This finding collaborates with that of Adeyemi & Olufemi (2019) and Egwuonwu (2022), who reported the efficacy of the therapy in the treatment of examination anxiety over the control group. It also agrees with that of Ahmed et al. (2020), who found that students who practiced positive re-framing techniques were less likely to experience overwhelming test anxiety and performed better academically. Also, the findings agree with those of Neba & Chi (2023), whose findings revealed that students who received cognitive restructuring training showed higher levels of self-efficacy and lower test anxiety.

The REBT posits that the negative statements on participants' attitudes toward examination may make them develop a dislike for examination and eventually avoid examination. This negative attitude might aggravate examination tension in them. Therefore, when participants were exposed to REBT techniques, they were able to learn how to manage their obsessive thoughts. These exposures could have accounted for the significant reduction recorded in the study. On the whole, the results confirmed that the treatment had a significant effect in reducing the examination anxiety levels of the participants.

5. Conclusion

This research set out to assess the efficacy of rational emotive behavioral therapy as an antidote in reducing mathematics examination anxieties. The findings revealed that such interventions positively affect students' emotional and behavioral competencies. Students who participated in the sessions were more likely to demonstrate less anxiety in examinations, greater emotional regulation, and to improve their beliefs and philosophies. This affirms the relevance of REBT in addressing common psycho-social issues in Cameroonian secondary schools.

5.1 Implications of the Study

The findings from this research carry multiple implications for various stakeholders in the educational ecosystem. The findings of this study indicate that applying REBT Interventions within school programs in Bamenda III can significantly enhance students' beliefs and philosophies. Educational programs should incorporate components such as behavioral techniques, emotional regulation, and cognitive restructuring into school counseling and life skills curricula. This will not only help students to have less

examination anxiety but also foster a school culture built on self-efficacy and intrinsic motivation.

6. Recommendations

Based on the findings and implications, the following recommendations were proposed: The Ministry of Secondary Education should integrate REBT intervention modules into the national school counseling policy, with a focus on practical training for counselors in conflict-affected areas like Bamenda III. School Counselors and Psychologists should adopt structured counseling programs centered on REBT to guide students in cognitive restructuring, behavioral and emotional regulation. Educational Institutions in Bamenda III should implement regular in-service training for teachers on REBT techniques to foster consistency in behavioral and emotional management and instructional practices.

Conflict of Interest Statement
The author declares no conflicts of interest.

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