Eradicating Mathematics Anxiety Among Secondary School Students Using Cognitive Behaviour Therapy (CBT)

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Abstract: Achievement in Mathematics to a large extent, is a function of examination anxiety, teachers' instructional strategy, among other variables. The Onus of this paper is to empirically document the effectiveness of CBT in curbing mathematics anxiety in students in Nigeria. A sample of 154 students was composed. The instrument used is Mathematics Anxiety Test Scale (MATS). The reliability coefficient of 0.83 was obtained. The 154 students were pretested and those (68) who scored 24 and above were assigned to experimental group. Two research questions and two hypotheses guided the study. Research questions were addressed using mean and standard deviation while hypotheses were tested with t-test, ANCOVA. The result indicates a therapeutic significant difference in reduction of Mathematics anxiety of students and in terms of gender, no score differential. It was recommended that workshops/Seminars on psychological techniques on examination anxiety be organized for mathematics teachers. Additionally, textbooks on such therapeutic techniques should in circulations

Keywords: Mathematics, Anxiety, Cognitive Behaviour, Therapy.

I. INTRODUCTION

Sometimes Students do not do well in examinations not because they are not intelligent but because some extraneous factors like anxiety interfered with their academic functioning and level of achievement.

According to Frend (1949), Anxiety is "something felt" a specific unpleasant emotional state or condition of human organism. It is also a state of emotional and physical disturbance induced in a person by a real or imagined threat. Anxiety manifests itself differently from other emotions in terms of gestures, posturing performance of interpersonal and also quality of voice. It becomes more dangerous when it is encountered by students during examinations. It causes some students to experience some physiological reactions during examination such as increased heart rate, cold hands, frequent urination, dried mouth, muscle spasm, increase respiration (Zeidner, 1998). These are manifested when taking Mathematics examination. Examination anxiety is dangerous to the growth of an educational system because it brings about poor academic performances of students and this accelerates into decline in educational growth (Ossai, 2004) He also reported a significant correlation between students examination anxiety and their examination malpractice attitude.

Mathematics is one of the compulsory school subjects in Nigeria at both primary and secondary levels. It is very important in arts, social sciences and science subjects. It is widely applied in professional fields such as medicine, pharmacy, engineering, architecture, law, accounting etc. (Onwuka and Kolo, 2010).

However, it is a subject that is dreaded by many students. To many, it is an abstract subject meant for very few. This makes many students to have mathematics phobia and experience anxiety when they hear the name "Mathematics". To Onwuka (2012), Mathematics Phobia is a persistent fear

towards the study of mathematics which leads student to avoid mathematics.

With these problems associated with mathematics anxiety, it becomes necessary to seek ways/means that can help ameliorate this ugly phenomenon. In this regard, the relevance of some psychological counseling therapies cannot be overemphasized; and Systematic Desensitization (SD), cognitive behavioural therapy (CBT), psychoanalysis, rational emotive behaviour therapy (REBT), easily come to mind.

Cognitive Behavioural Therapy (CBT) is a psychotherapy based on cognitions, assumptions, beliefs and behaviours, which aims at influencing disturbed emotions that relate to inaccurate appraisal of events (Lin, 2008). CBT has been widely used to treat various kinds of maladaptive disorders including mood and examination anxiety disorders. Since it is based on changing the students' erroneous ways of thinking about themselves, the world and how others perceive them, it can be applied to curb the problem of mathematics anxiety. CBT increases a sense of control and thereafter helps the student adhere to behaviour change strategy as well as improving mood and inducing associated psycho-pathology (Kenger, 2006).

II. STATEMENT OF PROBLEMS

Mathematics is a school subject that is very important in everyday living. It is applied in sciences, technical and non technical areas. Mathematics examination anxiety is dangerous to the academic growth and development of any nation. It is associated with some negative phenomenon such as physiological reactions (worry, fear) and examination anxiety. Cognitive Behaviour Therapy is one of the psychological therapies that has been successfully applied increase such as health, education and can equally be tried in mathematics in Nigeria. The problem of this study therefore is: What is the effect of cognitive Behaviour therapy on anxious mathematics students?

RESEARCH QUESTIONS

✓ To what extent does cognitive behaviour therapy reduce examination anxiety in mathematics?
✓ To what extent does cognitive behaviour therapy reduce mathematics anxiety in male and female students ?

RESEARCH HYPOTHESES

The following null hypotheses guided the study and was test at .05 level of significance.

Ho1 There is no significant difference between the pre-test and post-test scores of mathematics students treated with cognitive Behaviour Therapy.

Ho2 There is no significant difference in the reduction of mathematics examination anxiety in male and female students using cognitive Behaviour therapy.

PURPOSE OF STUDIES

The main purpose of the study is to investigate the effectiveness of cognitive Behaviour Therapy (CBT) in the treatment of students examination anxiety in mathematics.

III. METHOD

The researcher adopted a quasi-experiential design. It investigated the possible cause and effect relationship by exposing one treatment group and one control group (not exposed to treatment). The population comprised all the senior secondary school-two students in Ika south Local Government Area of Delta State in Nigeria. A total 2025 were involved consisting 1038 male and 987 female students.

In composing the sample, first purposive sampling technique was employed to eliminate, the schools that are not co-educational, This is as a result of gender analysis. At the second stage, Six schools were selected to form the sample with a sample size of 68 students, made up of 33 males and 35 females.

The research instrument, was mathematics Anxiety Test scale (MATS) modified from Sarason Test Anxiety Scale which contained 37 items. All the students were tested. The result of the pre-test enabled the researchers to identify those that have anxiety and they were accordingly assigned to experimental and control groups.

To establish the reliability of MATS, Combach Alpha reliability method was used and an index of 0.83 was obtained which showed an evidence of internal and external consisting of the instrument, Those who scored between 24 and 37 are those who showed symptoms of anxiety. They were exposed to seven weeks treatment. At the end of the seven weeks training, they were given the same MATS again in order to ascertain the effectiveness of the training. Mean and standard Deviation (SD) were used in answering the research questions while the null hypotheses were tested using t-test, Analysis of covariance (ANCOVA) at 0.05 level of significance.

RESEARCH QUESTIONS 1

To what extent does cognitive behaviour therapy reduce examination anxiety in Mathematics?

CBT	Pre-Test Scores	Post Test Score
Means (x)	28.59	16.38
S.D.	2.34	6.95
N	68	68

Table 1: Reduction of Examination Anxiety in Mathematics

Table 1 above addressed the research question, There was a reduction in the means score of mathematics anxiety of the students treated with cognitive therapy from 28.59+2.34 of the pre- test scores to 16.38 + 6.95 of the post-test.

The mean difference is 12.21.

RESEARCH QUESTION 2

To what extents does cognitive behavior therapy reduce mathematics anxiety in male and female students?

Gender		Pretest scores	Post test scores	Means difference
Male	N	33	33	
	X	27,88	17.03	10.85
	S.D	2.16	5.80	
Female	N	35	35	
	X	29.26	15.77	13.49
	S.D	2.33	7.93	

Table 2: Mathematics Examination anxiety in Male and female students

The mean value for the male students reduced from 27.88 before treatment to 17.03 after treatment while for the female students, it reduced from 29.26 to 15.77. The mean difference is therefore 10.85 and 13.49 for male and female students respectively.

HYPOTHESIS 1: There is no significant difference between the pretest and post-test scores of mathematics students treated with cognitive behaviour therapy. The result of the test is present in table 3.

	Faired differences				T	df	Sig	Remark
	X	S.D	S.E.M	95% confidence				
Pretest & post-test scores	12.21	7.18	0.87	10.47 — 13.95	14.01	67	0.00	Significant

Table 3: Paired sampled t-test of post-test and pre-test of scores mathematics student treated with CBT

Table 3 shows that there was a significant difference between pretest and post-test scores of mathematics students treated with cognitive behaviour therapy, with mean difference of 12.21 with 95% confidence interval ranging from 10.47 to 13.95, t-value is 4.01. The null hypothesis is therefore rejected.

HYPOTHESIS 2: There is no significant difference in the reduction of mathematics examination anxiety in male and female students using cognitive Behaviour therapy. Test result is given in table 4.

Source	Types sum of square	df	Means square	F	Sig	Partial square	Remark
Correct mode	59.39	2	29.70	0.61	0.55	0.02	
Intercept	22.87	1	22.87	0.47	0.50	0.01	
Pretest	32.48	1	32.48	0.66	0.42	0.01	
Gender	44.16	1	44.16	0.90	0.35	0.01	
Error	3180.67	65	48.93				
Total	21490.00	68					
Correct total	3240.06	67					Not significant

Table 4: ANCOVA Of Mathematics Examination Anxiety in male and female students using CBT

From Table 4, F(1,65) = 0.90, P =0.35. The effect size which is very low is 0.01 representing only 1% variance. Comparing the pre-test and post-test scores of male and female mathematics students, it was not significant as show by the P value of 0.42 (f(1, 65) = 0.66). Hence there is no significant difference in the reduction of mathematics examination anxiety in male and female students. Hence the null hypotheses is accepted.

IV. DISCUSSION

The result of the experiment shows that there is a significant difference between the pre-test and post-test scores of mathematics students treated with cognitive behaviour Therapy (CBT). In Otherwords CBT was effective in the treatment of mathematics anxiety among secondary school students. The difference is really reflected in the pre-test and post-test mean scores of 28.59 and 16.38 respectively. The mean scores reduction of 12.21 after treatment indicates an evidence of an effective treatment. It showed that students who were treated with CBT had their anxiety level reduced after treatment. The result is in consonance with the study conducted by (Salami 2007). He examianed the effectiveness of CBT in managing stress among some trainees of college of education in kwara state, Nigeria. The result indicated that the participants had significant reductions in levels of stress, depression and anxiety. The study conducted by Omotosho, Titiloye and Titiloye (2013) is also in line with the above result. Their work centred on reduction of mathophobic level among in-school adolescents in Nigeria using Rational Emotive Behaviour – Therapy (REBT). The result showed significant reductions in mathophobic levels on those treated with REBT.

The findings on gender difference on Mathematics students examination anxiety reveals no significant difference in the reduction of examinations anxiety in male and female students. Hence gender had no influence on students post-test scores.

V. CONCLUSION/RECOMMENDATIONS

The study investigated the effectiveness of cognitive behaviour. Therapy (CBT) in the treatment of mathematics anxiety among secondary school students in Nigeria. From this study we can conclude that CBT is effective in the treatment of mathematics examination anxiety among secondary school students. Additionally, there is no gender influence in the reduction of examination anxiety.

Based on the conclusion reached we therefore recommend that
- ✓ Mathematics teachers should be trained on therapeutic techniques of reduction of mathematics examination anxieties. This can be done by orgnising seminars and workshops.
- ✓ Text Books on such therapeutic techniques should be in circulation.
- ✓ Students should cultivate good reading habit. Through reading situations that can lead to high anxiety level could be averted.

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