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UTILIZING SELF-MANAGEMENT TECHNIQUE IN REDUCING MATHEMATICS ANXIETY AND IMPROVING ACADEMIC ACHIEVEMENT AMONG EARLY CHILDHOOD CARE EDUCATION PRE-SERVICE TEACHERS IN TERTIARY INSTITUTIONS IN OWERRI MUNICIPAL COUNCIL OF IMO STATE

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Abstract
The study utilized self-management techniques to reduce mathematics anxiety and to improve academic achievement among pre-service ECCE teachers in Imo state. Based on the purpose of the study, four research questions were raised and four hypotheses were formulated and tested at 0.05 level of significance. The study adopted the Quasi experimental research design specifically the pretest-posttest group design. The population of the study comprising of 575 Pre-service teachers. A sample size of 65 Pre-service was used for the study comprising 30 males and 35 females. The instruments for data collection were Mathematics Anxiety Questionnaire (MAQ) and Mathematics achievement test (MAT). The reliability co-efficient(r) of 0.89 and 0.82 respectively was obtained using K-20 and test-retest method respectively. The research questions were answered using mean and standard deviation and the hypotheses were tested using t-test statistical tool. The findings of the study showed that Self-management was an effective treatment technique in reducing mathematics anxiety and improvement of academic achievement irrespective of gender. It was recommended that Self-management technique should be adopted by school guidance counsellors and other allied professionals as an effective treatment helping mathematics-anxious students and for promoting students" academic performance in schools. In enhancing academic achievement in school setting, support strategies such as educational guidance and counseling, teaching life skill programmes and psychotherapy should be promoted.

Key words: Self-Management Technique, Mathematics Anxiety and Academic Achievement

Introduction

Anxiety is an unpleasant feeling characterized by fear or feeling apprehensive. It is evident when the person is worried and has some concern over an issue. It is one of the human emotions and is a feeling which many people undergo at some point in time. Anxiety is a reaction to tension which is experienced by the leaner. This reaction can be

emotional or physical. Anxiety as defined by Asadullapoor, Fati and Gharaee in Unamba, Onykwere and Ibe (2016) as feeling that undesirable and unclear like when person predicts a danger situation. Anxiety is a common phenomenon that constitutes a universal cause of student's poor academic performance.

Mathematics anxiety is inability of the learner to perform mathematics calculations, such as an ability of the learner to cope with quantification, and more generally mathematics (Perry 2004). Bursal and Paznokas (2006) opined that mathematics anxiety is a state of discomfort that occurs in response to situations involving mathematical tasks that are threatening to self-esteem and panic, helplessness, paralysis, and mental disorganization arising among some students when they are required to solve a mathematical problem. Oxford and Vordick (2006) added that mathematics anxiety as a disabling condition when students struggle with mathematics. Mathematics anxiety refers to a wide range of negative emotional responses related to mathematics and situations involving mathematics (Ashcraft & Ridley, 2005).

Mathematics anxiety has been defined as feelings of tension and anxiety which interfere with the manipulation of numbers and solving mathematical problems in open variety of social life and academic situation. Mathematics anxiety defines as psychological feelings of tension (Richardson & Suinn in Marianne & Noel, 2016). Mathematics anxiety can be manifested with some symptomatic characters by which to identify that the learner is suffering from Mathematics anxiety. There are physical, psychological and behavioral symptomatic characters. In physical symptoms, it is associated with the increasing of heart beat, clammy hands, appears light headiness and upset stomach.

There are many causes for Mathematics anxiety among the school students. Mathematics anxiety is caused by poor test result, negative classroom experience, lack of eagerness to complete difficult assignment, negative attitude towards the mathematics learning among the parents and even teachers. In a study conducted by Newstead (1995), the most possible causes of Mathematics anxiety include teacher's anxiety, societal factors, educational and environmental factors, classroom experience, innate cognation of Mathematics, failure in school achievement test and class room punishment.

In school, assessment and evaluation system using test examination can increase the tendency to develop negative attitude to the students' mind about Mathematics and enlarged the area of Mathematics anxiety (Scarpello, 2007). It is harder to learn Mathematics to the students due to lack of conceptual understanding the mathematical situation with computation skills. The result of test examination among the school students can increase the tendency towards the mathematics anxiety (Schoenfeld, 1988). Sometimes the teacher can discourage the willingness to know Mathematics among the students and teacher dislike to give answer to the students' asking questions which are a sign of desire of learning (Jackson and Leffingwell, 1999).

Academic achievement or (academic) performance is the outcome of education, the extent to which a student, teacher or institution has achieved their educational goals. Gender as a variable in this study has been observed to influence performance in mathematics. Some

studies have reported gender differences while others have that there is no significant difference in male and female Mathematics performance at any level. For instance, Bassey, et al (2015) indicated that, there exists significant gender difference in rural students Mathematics achievement in favour of males in Nigeria. Wille (2002) investigated the use of multicomponent intervention including token-economy in reducing disruptive classroom behaviours. The result of study affirmed that token-economy have been one of the most effective ways to improve effective classroom behaviours. The present study to ascertain whether self-management technique would be effective in reducing mathematics anxiety among pre-service teachers in tertiary institutions. Therefore, this study intends to investigate Utilizing Self-Management Techniques in reducing mathematics anxiety among early childhood care education pre-service teachers in Imo State.

Research Questions

1. What is the mean score of pre-service teacher's mathematics anxiety before and after implementing self –management technique?
2. What is the mean score of male and female pre-service teachers on mathematics anxiety after implementing self –management technique?
3. What is the mean achievement score of pre-service teachers in mathematics before and after implementing self-management technique
4. What is the mean achievement score of male and female pre-service teachers in mathematics before and after implementing self- management technique

Hypotheses

1. There is no significant difference between the pre-test and posttest mathematics anxiety mean scores of the pre-service teachers in the experimental and control groups.
2. There is no significant difference between the male and female mathematics anxiety mean scores of pre service teachers after implementing self –management technique.
3. There is no significant difference between in the pre -test and posttest mathematics anxiety mean scores pre-service before and after implementing self –management technique.
4. There is no significant difference between the male and female mathematics anxiety mean scores of pre-service teachers after implementing self –management technique

Methodology

The research design for the study was Quasi- Experimental research involving Pretest – Posttest group design. The population for this study was year two (2) comprising of 575 pre-service teachers in Alvan Ikoku Federal college of Education from Owerri Municipal Council. A sample of 65 pre-service was identified with mathematics anxiety consisting of 30 males and 35 females. A purposive sampling technique was used in selecting the level (year two) because the pre-service teachers were identified as having high mathematics anxiety. The instrument that was used for this study is a Questionnaire. A questionnaire was designed to measure how anxious the students were and to gather reasons for their

worrisome thoughts. The Mathematics Anxiety Questionnaire (MAQ) is acknowledged to be the most widely-used instruments (Preston, 2008). MAQ, more recently, Wigfield and Meece (1988) constructed the MAQ that had seven items to measure the emotionality component and four for the cognitive part, which relates to the worrisome nature about having to do well. As advocated by Alexander and Cobb (1984), mathematics anxiety includes the uneasiness felt when sitting for tests or when receiving test scores. The questionnaire was approved by the school's mathematics level head teacher and reviewed by a mathematics professor in the National Institute of Education Nsukka. Improvements made included the deletion of uncommon situations in secondary schools, like doing long numerical division. Modifications were also made to terminology to make it more appropriate for local use.

The final version had 37 items on a 4-point scale, from zero (not anxious) to three (very anxious) and a free-response question to elicit causes of anxiety. The first 16 statements focused on reactions or thoughts about mathematics and the remaining items were mathematics-related tasks where students rate their anxiety level. The researcher adopted the instrument. Another instrument used for data collection is Mathematics Achievement Test (MAT): It was constructed by the researchers with special attention on 2 and 3-D shapes. MAT focused on four areas (i) calculation of Area of shapes (ii) perimeter (iii) volume of solid shapes (iv) surface areas. MAT consists of 60 items objective with options from A to D. it was developed using a table of specification as guide. The instrument, mathematics anxiety Questionnaire (MAQ), was adopted; it was not subjected to validation because it has been revalidated in Nigeria by Ezeokana, Obi-Nwosu and Okoye (2014), Onukwufor (2013) and Sidney-Agbo (2016). This current study therefore adopted the MAQ and did not have to do any further validation while MAT were validated by three experts in measurement and evaluation and two in mathematics education. They were instructed to check for the language level, relevance, ambiguity, plausibility, vagueness and content coverage of the instrument for the study. Their advice, comments, recommendations and suggestions were used to modify instruments.

The MAQ questionnaire was found to have internal consistency for the two subscales 0.85 and 0.92 and the reliability of MAT was found to be 0.93 using Kuder-Richardson (K-21). The researchers trained three (3) out of twelve mathematics teachers in the school used in the study for a period of two weeks. The training exercise was based on the purpose of the study. They were trained to assess the participants during the experimental exercise. Before the commencement of the experimental process the participants were pre-test to determine their cognitive backgrounds. The researchers prepared lesson notes and infused self – management technique on each of the topics during the Training exercise. Teachers introduce the topic (2 and 3 – D shapes) to the participants using prepared lesson notes with Instructional Materials. They were allowed to ask questions and proffer solutions among themselves and compare solutions strategies within themselves. They interacted with the teachers when difficulties were countered. Teacher gave participants room for questions in areas not clear and later responded. The treatment period lasted for 3 weeks. Each session lasted for 1hr 20 minutes. After which a post-test was administered to the participant. The test instruments were marked over 100%. The data generated was analyzed using mean and standard deviation for answering the research questions while t-

test statistical tool was used to test the hypotheses at 0.05 level of significant.

Results

Table 1: Mean and Standard deviation on level of pre-service teachers on mathematics anxiety before and after implementing self- management technique.

Variables	N	Mean	SD	Reduce Mean score
Before (Pre-test)	65	**63.34**	5.05	
After (post-test)	65	**15.56**	1.21	47.78

Results in table 1 shows that the mean level score of pre-service teachers' mathematics anxiety before 63.34 with a standard deviation of 5.05 while after the implementation of self –management technique the mean level was reduced to 15.56 with a standard deviation of 1.21 This implies that mathematics anxiety of pre-service teachers was reduced with a mean score of 47.78 after implementation of self –management technique.

Table 2: Mean and standard deviation on gender self – management Technique

GENDER	N	MEAN	SD	MEAN Gain
MALE	30	**7.56**	3.43	0.4
FEMALE	35	**8.00**	3.18	

Table 2 shows that the mean score of male pre-service teachers' mathematics anxiety after implementing self –management technique at post-test is 7.56 with standard deviation of 3.43 while female pre-service teachers is 8.00 and a standard deviation of 3.18. Their mean difference is 0.4. The slight difference is in favour of female pre-service teachers.

Table 3: Mean and Standard deviation on level of pre-service teachers' achievement scores in MAT

Variables	**N**	**Mean**	**SD**	**Mean Gain**
Before (Pre-test)	**65**	**10.78**	**1.67**	
After (post-test)	**65**	**60.03**	**4.06**	**49.25**

Results in table 3 shows that the mean score of pre-service teachers on MAT 10.78 with a standard deviation of 1.67 while after the implementation of self –management technique the mean score was 60.03 with a standard deviation of 4.06 This implies that MAT of pre-service teachers was improved with a high mean gain of 49.25 after implementation of self –management technique.

Table 4 Mean and standard deviation on gender achievement scores after implementing self – management Technique

GENDER	N	MEAN	SD	MEAN Gain
MALE	30	30.02	4.21	0.01
FEMALE	35	30.01	4.30	

Table 4 shows that the mean achievement scores of male pre-service teachers after implementing self –management technique at post-test is 30.02 with standard deviation of

4.21 while female pre-service teachers are 30.01and a standard deviation of 4.30. Their mean difference is 0.01 The slight difference is almost insignificant but in favour of male pre-service teachers.

Hypotheses testing

Table 5: t-test on pre-service on mathematics anxiety before and after implementing self-management technique.

GROUP	N	MEAN	SD	*a*	Df	t-cal	t-tab	Decision
Pre-Test	65	**63.34**	**5.05**		63	18.45	1.96	Reject
Post -Test	65	**15.56**	**1.21**	**0.05**				HO

Result in table 5 showed that calculated t-value of 18.45 is significant at (P<0.05) the null hypothesis is rejected and the researchers concludes that there is significant difference in the mean scores of pre-service after implementing self-management technique.
There is no significant difference in the mean scores of male and female pre-service on mathematics anxiety teachers after implementing self –management technique.

Table 6: Analysis on Gender pre-service teachers after implementing self – management technique

Gender	N	Mean	SD	*a*	Df	t-cal	t-tab	Decision
MALE	30	7.56	3.43	0.05	63	0.08	1.96	Accept
FEMALE	35	8.00	3.18					HO

Table 6 shows the calculated t-value of 0.08 is not significant at (P>0.05) the null hypothesis is accepted and the researchers concludes that there is no significant difference in the mean scores on gender pre-service teachers after implementing self – management technique.

There is no significant difference in the mean achievement scores of pre-service on mathematics test before and after implementing self – management technique.

Table 7: Analysis on Achievement test on MAT

GROUP	N	MEAN	SD	*a*	Df	t-cal	t-tab	Decision
Pre-Test	65	**10.78**	**1.67**		63	13.07	1.96	Reject
Post -Test	65	**60.03**	**4.06**	**0.05**				HO

The result of the t-test shows the calculated t-value of 13.07 is significant at (P<0.05) the null hypothesis is rejected and the researchers concludes that there is significant difference in the mean achievement scores of pre-service after implementing self-management technique.

Table 8: Analysis on Gender pre-service teachers after implementing self – management technique

Gender	N	Mean	SD	*a*	Df	t-cal	t-tab	Decision
MALE	30	30.02	4.24	0.05	63	0.02	1.96	Accept
FEMALE	35	30.01	4.30					HO

The t-test shows the calculated t-value of 0.02 is not significant at (P>0.05) the null hypothesis is accepted and the researchers concludes that there is no significant difference in the mean achievement scores on gender pre-service teachers after implementing self – management technique.

Discussion

Findings from the data analyzed indicated that Self-management technique was effective in reducing mathematics anxiety among pre-service teachers. This result supports the earlier findings by Shearer *et al.* (1996) who found that self- management technique was effective in reducing test anxiety among students. The finding is equally in line with previous study by Alberto and Troutman (2009) whose discovered that the use of the self-monitoring intervention significantly increased the student's compliance with the classroom-preparedness skills for all the participants and successfully reduced their test anxiety level. The finding from the study also is in line with some other studies like King-Sears and Carpenter (1997).

The result from the data analyzed further indicated that is no significant difference on self-management technique in reducing mathematics anxiety among male and female among pre-service teachers. This result is in agreement with the finding of Egbochukwu, Obodo and Obadan (2008) that sex had no significant effect on the reduction of test anxiety of students.

The finding showed that self – management technique improves the academic achievement of pre-service teachers in mathematics. This finding is in line with findings Stober and Pekrun (2004), Sawyer and Hollis-Sawyer (2005).

Conclusion

The study investigated utilizing Self-management technique in reducing mathematics anxiety among pre service teachers. This study confirms previous research that reported the positive effect of Self-management technique for various behaviours exhibited by test-anxious students. The study concludes that Self-management is an effective treatment technique in reducing mathematics anxiety and improvement of academic achievement irrespective of gender.

Recommendations

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

1. Self-management technique should be adopted by school guidance counsellors and other allied professionals as an effective treatment helping mathematics-anxious students and for promoting students" academic performance in schools. In enhancing academic achievement and mental health in school setting, support strategies such as educational guidance and counselling, teaching life skill programmes and psychotherapy should be promoted.
2. Counsellors should be an integral part of any educational department, especially at the tertiary level, in order to boost self-confidence and test-taking ability of the students.
3. Governments and school administrators should give adequate support to counsellors and mathematics teacher's alike, by providing conducive environment

and giving adequate incentives to boost teaching activities in schools.

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