Global Journal of Arts Humanity and Social Sciences ISSN: 2583-2034

GSAR PUBLISHERS
GLOBAL SCIENTIFIC AND ACADEMIC RESEARCH

Glob. J.Arts.Humanit.Soc.Sci
ISSN: 2583-2034
Vol-2 Iss-7, page 422-427

Effects of Self-management Techniques on Mathematics Anxiety among junior secondary school students

BY

[1]Uzoekwe, Helen Efeyadu *(PhD)*, [2]Nnadi, Grace Chinyere *(PhD)*, [3]Etele Valentina Anulika *(PhD)*, [4]Nwobi Ngozika Lovina, (Ph.D),[5]Ofojebe, Edna Nkechi *(PhD)*

[1,2,3,4,5]Department of Guidance and Counselling, Nnamdi Azikiwe University, Awka Anambra State, Nigeria.

Article History
Received : 06/07/2022
Accepted : 15/07/2022
Published : 18/07/2022

Corresponding author:

Uzoekwe, Helen Efeyadu *(PhD)*

Abstract

The issue of mathematics anxiety among some secondary school students has been among source of worry among the stakeholders in education. In this study therefore, the researcher examined the effects of systematic desensitization and self-management techniques on mathematics anxiety of junior secondary school students in Awka South local government of Anambra state. A quasi experimental design which adopted a pre-test, post-test and control group method is used in this study. The population of the study comprise of 576 secondary school students who are mathematics anxious. The sample size for the study is 80 students. These students are sampled through purposive sampling. The study used Abbreviated Mathematics Anxiety Scale (AMAS) as instrument developed by Hopko, Mahadevan, Bare and Hunt which was adapted and revalidated in Nigeria. The findings of the study discovered that self-management techniques have positive effects on the mathematics anxiety of the students. It is recommended among other things that counsellors should extend the use of self-management techniques on reduction of mathematics anxiety of students and also teachers should be observing their students closely during and after class lessons in order to identify those who are manifesting symptoms of anxiety of any type so that they will be directed to the counsellors for proper attention towards eliminating the unacceptable behaviour.

Keywords: self-management, techniques, mathematics, anxiety and junior secondary school students.

Introduction

Mathematics is seen as the central intellectual discipline of every technological environment. Understanding of natural problems will become shallow if there is no mathematics. In Nigeria for instance, attention has been made on the teaching and learning of Mathematics, as a way of improving students' academic achievement in subjects at levels of Nigeria Education System (Kolawale, 2007). The progress of any country depends on her scientific and technological advancement and can be only built when there is a sound mathematical education that is capable of making the citizens effectively functional in the natural and applied sciences. The problem that is worrisome is that some secondary school students are having anxiety towards maths. Ordinarily, anxiety is a normal reaction of humans to stress and difficulties in life but it falls under the classification of behavioural problem when it becomes excessive. Anxiety is defined as stress, tension, and strain brought into one's body and mind as an unpleasant emotion, characterised by terms like apprehension, worry, dread, and fear which threaten the well-being of the individual (Ifeagwazi 2011). It has been an observable phenomenon that mathematics figures are numerous, complicated, and scaring. And as a result of it some students' mindsets towards mathematics is poor and their performances in mathematics have not been encouraging. An obvious effect of this mathematics anxiety among these students is that without credit pass in mathematics it will be difficult for them to gain admission into any university of their choice in the country. Also, it will make them choose their career choice outside mathematics thereby reducing the number of science subjects they are expected to explore in the scientific world of today.

Olin (2012) sees anxiety as worry or overreaction to a situation that is only perceived as menacing. Also, he emphasized that it is subjective to psychological and physiological states, characterised by somatic, emotional, cognitive, and behavioural components, and viewed as the displeasing feeling of fear and concern. Mahmood and Khatoon (2011) adduced that anxiety is such a common life experience that when dangerous situations are encountered, can sometimes create emotional problems especially when it becomes intense and persistence.

However, the causes of this problem is not yet clearly determined but Baloglu and Kocak (2013) suggested that some likely factors that are behind mathematics anxiety include the following: friends who said that mathematics is too difficult to understand, parents' comments to the hearing of their siblings that they saw mathematics as highly complicated and also teachers who are putting bias to the students by making them believed that there is a connection between the marks they got in the mathematics class and self-confidence. All these seemed to be triggering mathematics anxiety in some of the students and these made them devised ways of avoiding mathematics lessons. Some of the students saw their mates as threat in the mathematics class drills while some lost their appetite for food as a result of their anxiety towards mathematics. The effect of avoidance of mathematics as a result of anxiety is that the concerned students would be failing mathematics examinations or tests and getting of poor grades and this situation is ugly that something needs to be done.

Mathematic anxiety is a behavioural problem that needs the attention of the guidance counsellors in order to help these students function creditably well in their future areas of course of study and career. Behaviourists are of the view that learning deals with a change in behaviour and that it is achieved through a large amount of repetition of desired actions and a strong belief of how an individual manages self on given tasks (Ogugua 2016). This is in line with the belief that reward encourages good habits while bad habits are reprimanded and discouraged. Evidence from previous studies have shown that behavioural modification techniques can be effective in the management of anxiety responses (Flarbor-Peters 2014 and Azuji, Anyamene & Nwokolo 2015) although none has been applied on managing mathematics anxiety among junior secondary school students. The present study, therefore, adopts self-management techniques towards eliminating mathematics anxiety among secondary school students.

The choice of self-management technique is based on its efficacy in managing behavioural problems as suggested by Nwankwo & Obi (2013) including Walchelka & Katz (2012). Besides, individuals are capable of controlling their behaviour if taught how to and when this is done, the result will seem to be more lasting than when the control measures is being applied by an external person. Self-management has been known as an effective approach to improve classroom behaviour (Leone & Hall 2013). The goal of this treatment technique is to modify the thought processes of a person in order for him to understand his strength and weaknesses and assumed responsibility of his own actions. Self-management technique also involves joint formulation of goals by the counselor and the client. The task in self-management is that the client (student) has to use critical behaviour to monitor his own performance.

Self-management could also be separated based on the principles of contingency management and cognitive control strategies (Conway, 2015). The word self is defined as a person's essential being that distinguishes him from others, especially considered as the object of introspection or reflexive action (https://en.oxforddictionaries.com/definition/self, 2016) while the earliest formulation of self in modern psychology is derived from the distinction between the self as I, the subjective knower and the self as me which is the object that is known (Conway 2013). Anagbogu (2012) asserted that all parts of the self-enabled people to alter, change, add and modify aspects of them in order to gain acceptance even among school teenagers in society. Therefore, the self has different facets that form the integral parts which are managed by the self. Management, on the other hand, meant a process of dealing with or controlling things or people despite difficulties or regulations (Ryan and Deci (2015). On a functional basis, it may be viewed as an act of making people more effective than they would have been without assistance. Schlenker and Pontari (2016) opined that management has four functions which are: planning, organising, directing, and controlling. When the prefix, self is added to management, it becomes self-management and it means management that is directed towards oneself based on the individual's efforts and capabilities and how one controls his own behaviour. This is called self-management (Hendrick 2012).

Micheal (2011) defined self-management as the skills and strategies by which individuals can effectively direct their own activities towards the achievement of objectives. This includes goal setting, decision making, focusing, planning, scheduling, task tracking, self-evaluation, self-analysis, and the development of self. Mcleod (2016) asserted that self-management is management by oneself and the taking of responsibility of one's own behaviour and well-being. Also, for Newman and Eyck (2015); it was the use of behavioural strategies to modify one's own behaviour. For him, in self-management, the focus is on the change.

Some secondary school students who are victims of mathematics anxiety sometimes do think that they are lacking the capabilities and resources with which to excel in the subject as a result of self-doubt. Self-management therefore would be used towards reversing this trend. Self-management treatment is based on the principles of contingency and cognitive management. The contingency-based treatment highlighted the correlation between behavioural response and their consequences. Leone & Hall (2013) highlighted the strategies to include self-monitoring, self-study, self-analysis, self-reinforcement, and self-punishment which are examples of contingency-based self-management procedure. On the other hand, cognitive based self-management strategies emphasized the origin of a response. This was on the principle that an individual would examine his thought processes that comes before a response is made.

Moyela (2011) has carried out a work on students' perseverance in the face of adversity. Her design was ex-poste-factor and a total number of two hundred and four (204) students of senior class

(SSSI) from public and private secondary schools in Nsukka Local Government Education Authority constituted the sample size. Age range of the students was 15-17 years. Instrument used was the humanistic models of contribution. This was used to measure higher levels of the students' academic development and not their biological adjustment. Self-management technique was used to find out if students' optimism in carrying out academic tasks had an impact on their self-belief. The findings indicated that, students who persevered in academic task and relied on the objective judgement of their class teachers, were known to have had greater optimism, reduced anxiety, and achieved more in terms of self-belief and self-concept.

Moreover, Jones (2001) carried out a case study at Danville Community College. He followed two basic mathematics classes composed of fifteen (15) adolescents per class who were taught in the fall semesters of 1999 and 2000. The research determined whether clinical psychology theories, such as exploration and modification of dysfunctional perceptions, stress reduction, and self-management techniques would in fact alleviate mathematics anxiety and lead to improved mathematics performance. The two classes met at the same time of the day and used the same text and test resources. Anecdotally, the classes expressed similar maths and test anxiety. The teaching strategy for the 1999 class was traditional whereby the teacher explained new mathematics concepts and the students performed practice questions and memorised the steps and the rules required to solve the math problem. For the 2000 class, the teacher consciously tried to reduce maths and test anxiety by making the students use self-management techniques which included the students drawing up suitable timetables and analysing what they had studied all by themselves. At the start of each class, the teacher will enthusiastically say 'isn't it great we get to do maths today!'. Incentives were used for students to keep reviewing previously learned techniques and homework was left up to the individual, emphasizing the need for students to discover their learning style and determine how much practice they needed. The teacher used a casual approach to a new topic using some 'wondering out loud, followed by appropriate models for finding a solution and discussing its real-world application. The merits of each solution approach were noted and students were challenged to determine which one was more effective in reducing mathematics anxiety. The results showed that the class of 2000 had a higher percentage of satisfactory grades compared to the 1999 class. It is concluded that teaching strategies aimed at reducing maths anxiety was successful using the self-management techniques.

Steps in Administering Self-Management

- Bring the target behaviour under control, using externally managed (Counsellor or Teacher administered) treatment techniques, when necessary.
- Select a system of data recording, which is appropriate to the target behaviour and to the abilities of the people by acquiring or constructing the necessary materials (for instance, recording sheets, clip boards, timers and wrist counters).
- Let the clients determine with a proper guidance, the performance, and criterion that must be achieved to earn a reinforce. This criterion can be specific and challenging but also achievable. In the early stages, it should be possible to attain it immediately rather than distantly. Also, let the clients determine the proper guidance, the amount and type of reinforce to be administered.
- Instruct the individuals on how to use the data recording system. Considering modeling its use, stimulating and role-playing, conducting and supervising some practice data recording sessions in the environment in which the clients' actual recordings occur. Reinforcing the clients when their recordings match the counselor's and restraining them when their recordings are too inaccurate.
- Begin the actual clients' self-management sessions and un-obstructively monitor their performances, reinforcing term (with a bonus) when the clients self-evaluate their performances (against the criterion) matches the counsellor's evaluation and permitting them to self-reinforce for achieving the performance criterion.
- Be progressively, gradually fading the matching requirement and permit the clients to self-record and self-evaluate themselves independently. Gradually increase the performance criterion for reinforcement, conducting periodic announced checks of the clients' accuracy and appropriateness in self-reinforcing.

Therefore, self-management techniques are used to determine if their applications on individuals would lead to the achievement of the desired behaviour among secondary school students towards mathematics anxiety. The main purpose of this study is to determine the effects of self-management techniques on reducing mathematics anxiety among junior secondary school students in Awka south local government area.

Research Questions

The following two (2) research questions guides the study:

1. What is the mean response to mathematics anxiety of students in the self-management and control groups at pre-test and post-test?
2. What is the difference in the mathematics anxiety mean scores of male and female students treated with SMT at post-test?

Methodology

Research Design

This study is quasi-experimental research. Two groups of subjects are involved, one experimental group and one control group. The participants are drawn from two co-educational secondary schools. All of them are pre-tested. Then, one experimental group received treatment on mathematics anxiety using self-management techniques while the control group receives conventional method that is used by the maths class teacher. In the context of this study, a non-randomized pre-test-post-test and control group are used. Population of the study is 576 junior secondary school students in

JSS and the sample size of the study comprised of 80 junior secondary school **(JSS)** students who were mathematics anxious, in co-educational secondary schools. These students are sampled through purposive sampling using Abbreviated Mathematics Anxiety Scale (AMAS) instrument. Non-random sampling technique is used in assigning treatment models to the two groups, students with mathematics anxiety in school 'A' regarded as the treatment group one (42 students) are treated with a self-management technique, while students with mathematics anxiety in school B (38 students) known as the control group are given conventional guidance. The instrument for data collection is Abbreviated Mathematics Anxiety Scale (AMAS) developed by Hopko, Mahadevan, Bare, and Hunt (2003) but was revalidated in Nigeria by Adebule (2003). The AMAS is structured on a five (5) point rating scale ranging from 1=low anxiety, 2= some anxiety, 3= moderate anxiety, 4= quite some anxiety, and 5= high anxiety. Scores that are above the Nigerian norm mean score M=21.1 and the Standard Deviation (SD) = 7.0 indicated the presence of mathematics anxiety while scores below this showed no problem of mathematics anxiety. Only students with mathematics anxiety participated in the two treatments. The AMAS manual identified gender effects as follows: Females: M=21.9 and SD=6.9 while that of males: M=19.5 and SD=6.9. The students who scored below these scores are regarded as non-mathematics anxious students and therefore, did not participate in the study. The researchers adopted the instrument as it is and did not do any validation since it has been revalidated in Nigeria. The Co-efficient of reliability obtained from the Nigerian samples ranges from 0.78-0.80 (Ogugua, 2016). The data collected using the Abbreviated Mathematics Anxiety Scale (AMAS) administered to the students both in the experimental and control groups are analysed by the researchers to determine the mean scores. The mean gain and mean loss scores are used to ascertain the effects of self-management techniques on mathematics anxiety. The completed instruments are scored following the scoring instructions provided by the AMAS manual. The data relating to the research question is analysed using the mean and standard deviation.

Results

Result of Analysis Concerning the Mean Response to Mathematics Anxiety of Junior Secondary School (JSS II) Students in Self-Management Technique and Control Groups at Pre-test and Post-test

Table 1

Means, Standard Deviations of SMTG and CG at Pretest and Posttest.

	Pretest		Posttest	
Group	$\bar{X}$	S	$\bar{X}$	S
SMTG	29.67	2.98	13.76	1.86
CG	29.29	2.34	29.29	2.34

Table 1 above is used to present data on the mean responses to Mathematics anxiety of students exposed to Self-Management Technique group (SDTG) and the Control group at pre-test and post-test. The mean responses to Mathematics anxiety of the students in SMTG at the pre-test and post-test are 29.67 and 13.76 respectively. Similarly, their respective standard deviations at pre-test and post-test are 2.98 and 1.86. The mean responses to Mathematics anxiety of the students in CG is 29.29 at the pre-test and post-test. Similarly, their standard deviations is 2.34 at pre-test and post-test. The mean responses at post-test showed that SMTG had some effect on Mathematics anxiety of the students, as the mean is below the bench of 21.10 for those exhibiting anxiety. The large standard deviation values at pre-test indicate that the Mathematics anxiety scores of the individuals in the groups at pre-test are spread further away from the mean. However, the standard deviation of the students in SMTG at post-test is small, indicating that the Mathematics anxiety scores of the students in SMTG are spread around their mean.

Result of Analysis Concerning the Mean Response to Mathematics Anxiety of Male and Female Junior Secondary School Students in Self-Management Technique Group at Post-test.

Table 2

Adjusted Means, Standard Deviations of Male and Female Students in SMTG at Posttest.

	Female		Male	
Group	$\bar{X}$	S	$\bar{X}$	S
SMTG	13.529	1.90	13.954	1.85

Table 2 above is used to present data on the adjusted mean responses to Mathematics anxiety of male and female students, their mean difference, and the ANCOVA test of the significant of the mean difference in SMTG at post-test. The result in the table shows that the adjusted mean responses of male and female students in SMTG respectively are 13.529 and 13.954, while their respective standard deviations are 1.85 and 1.90. This indicates that the mean responses to mathematics anxiety of male and female students exposed to Self-Management technique do not differ significantly at post-test.

Discussion

Discussion of Findings on the Mean Response to Mathematics Anxiety of Junior Secondary School Students in Self-

Management Technique and Control Groups at Pre-test and Post-test

The findings of the study on the mean response to Mathematics anxiety of Junior Secondary School students in self-management technique (SMT) and control groups at pre-test and post-test revealed that the mean responses at post-test is reduced showing that SMT had positive effect on Mathematics anxiety of the students, as these mean at post-test is below the benchmark of 21.10 for those exhibiting anxiety. The standard deviation of the students in SMT at post-test is small, indicating that the Mathematics anxiety scores of the students in SMT are spread around the mean. This shows that majority if not all the students exposed to the self-management technique had their Mathematics anxiety behaviours improved by the treatment. This finding revealed that the Self-Management technique had a significant positive effect on the students that exhibited Mathematics anxiety. These findings are in collaboration with the findings of Johns; Schmader & Martens (2012) *and* Leone and Hall (2013) who found the self-management technique as an effective technique in the reduction of public speaking anxiety among students.

Discussion of Findings on the Difference between Mean Response to Mathematics Anxiety of Male and Female Junior Secondary School Students Exposed to Self-Management Technique at Post-test

The findings of the study on the difference between mean response to mathematics anxiety of male and female students exposed to self-management technique at post-test showed that the mean difference when the mean response to mathematics anxiety of male students is subtracted from that of female students is negative. The negative sign may suggest that the mean response to mathematics anxiety of male is higher than that of female or those female students responded better to treatment with self-management technique than their male counterpart. This finding is contrary to the findings of Curtain-Phillips (2010) and Franklin (2013) who found that female students responded more to the treatment with self-management technique than male students.

Conclusion

This study has provided useful link both in theory and practice. The theoretical propositions behind the treatment technique used in this study are tested and they have positive effects on mathematics anxiety. This indicated that mathematics anxiety which is an impediment to learning mathematics is treatable using self-management techniques.

Recommendations

From the findings of this study, the following recommendations are made:

The researcher recommended that counsellors should be making use of self-management techniques towards reducing the mathematics anxiety of students.

Every secondary school should have an equipped counselling centre that must be under the control of Professional counsellors. This will enhance prompt proper diagnoses and treatment of the students exhibiting behavioural problems in the schools such as mathematics anxiety.

Also, teachers should observe their students closely during and after class lessons in order to identify those who are manifesting symptoms of anxiety of any type so that they will be directed to the counsellors for proper attention towards eliminating the unacceptable behaviour.

References

1. Anagbogu, M.A. (2012). *Counselling in schools: The implications of changing students' antisocial behaviour. Journal of Counsellng and Communication, 4 (1), 118-124.*
2. Azuji, I., Anyamene, A, & Nwokolo, C. (2015).Effects of systematic desensitization technique on test anxiety among secondary school students. International Journal of Humanities, Social Sciences, and Education (IJHSSE), 2(2), 167-178.
3. Baloglu, M. & Kocak, R. (2013). *A multivariate investigation of the differences in mathematics anxiety. Personal-individual differences,40 (7) 1325-1335.*
4. Conway, D. (2013). *Women Becoming Mathematicians: Creating a Professional Identity in Post-World War II America* (Cambridge, Mass.: The MIT Press, 2014).
5. Curtain-Phillips, M. (2010). *Math Attack: How to Reduce Math Anxiety in the Classroom, at Work, and in Everyday Personal Use.* (Atlanta: Curtain-Phillips Publishing, 2010).
6. Flarbor, A. & Peters, V.F.A. (2000). Unmasking some aversive aspects of schools' mathematics and strategies for averting them. An inaugural lecture. University of Nigeria Nsukka.
7. *Franklin, M. (2013). Add-ventures for girls: building math confidence, Junior High teacher's guide. Newton, Massachusetts: WEEA Publishing Centre.*
8. Hopko, D.R.; Mahadevan, R.; Bare, R. & Hunt, M.K. (2003). The abbreviated mathematics anxiety scale (AMAS): Construction, Validity and Reliability Assessment, 10,173-182.
9. Ifeagwazi, M.C. (2011). *Influence of demographics variables in test anxiety among students. International journal of educational research, 8, 1-11.*
10. *Johns, M.; Schmader, T.; Martens, A. (2012). Knowing is half the battle: Teaching stereotype threat as a means of improving women's math performance. Psychological Science. 16: 175–179.*
11. Jones, B. (2001). *Modification of dysfunctional perception in alleviating mathematics anxiety. Danville Community College. Journal of science, 67 (2).*
12. Kolawale, E. B. (2007) Cognitive Entry Grade as Predictor of Students' Academic Performance in Mathematics in Nigeria Universities. Medwell Journal of Social Sciences, 2(3), pp 323-326.
13. Kurumeh, M. S. and Iji C. O. (2009) Improving Students' Achievement in Solving Algebraic Word

Problem Using Aesthetic Value Approach. Journal of MAN 34(1), 37-45.

14. Leone, C. & Hall, I. (2013). Self-monitoring, marital dissatisfaction and relationship dissolution: Individual differences in orientations to marriage and divorce, self-identity, 2, 189-202.
15. Mahmood, T. & Khatoon, S. (2011). Development and validation of the mathematics anxiety scale for secondary school students. Br. J. Arts Soc. Sci. 2 (2).
16. Mcleod, S.A. (2016). *Systematic desensitization. Retrieved from: https://www.simplypschology.org/systematic-desensitization.html mathematics -anxiety and performance. Journal of Experimental psychology general 130 (2) 224-237.*
17. Michael (2011). Episode 54: Math Anxiety – Causes and Cures"2008, http://www.thepsychfiles.com/2008/04/episode-54-math-anxiety-causes-and-cures/September 7, 2009.
18. *Morgan, D. (2010).* Design and analysis in educational research. Proudly powered by Word Press.
19. Moyela, B. (2011). Effects of perseverance in the face of adversity of secondary school students in mathematics. Vol. 12 Issue 2 Article 7.
20. Newman, B. & Eyck, P.T. (2015). *Self-management of initiations by students diagnosed with autism. The Analysis of verbal behaviour, 21, 117-122.*
21. Nwankwo, C.A.; Obi, J.S. & Obi, I. (2014). *Effects of study skills technique in reducing test anxiety among secondary school adolescents in Anambra state. General studies on education, science, and public issues in Africa, 4 (1), 51-59.*
22. Ogugua, G. (2016). Relative effectiveness of systematic desensitization and self-management techniques in reducing mathematics anxiety among primary school pupils in Delta state.
23. Schlenker and Pontari (2016). *Measurement error of scores on the Mathematics Anxiety Rating Scale across studies". Educational and Psychological Measurement. 61: 373–386. doi: 10.1177/00131640121971266.*
24. Scott, M.S. (2012). Test anxiety: stress management. Retrieved from: https://www. stress.about.com on 24th April, 2012.
25. Self-Management (2016). (https://en.oxforddictionaries.com/definition/self