



Effects of Logotherapy Technique in Managing Mathematics Anxiety of Junior Secondary School Students in Owerri Education Zone I

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Abstract

The study investigated the effect of logotherapy technique in managing Mathematics anxiety of junior secondary school students in Owerri Education Zone I of Imo State. To guide the study the researchers asked four research questions and tested four hypotheses. The study adopted quasi-experimental research design, which involves pre-test, post-test, control treatments non-equivalent design. The study was carried out in Owerri Education Zone 1 of Imo State. The sample size for the study is 44 drawn from a population of 32,763 students in junior secondary school two (JSS2) using a multi-stage stratified cum cluster, purposive and simple random sampling techniques. The instrument for data collection for this study was Abbreviated Mathematics Anxiety Scale (AMAS). The major findings of the study are that the Logotherapy technique had a positive effect on reducing mathematics anxiety among the participating students. Notably, the positive effects of Logotherapy persisted over time, indicating a positive retention effect. The study did not find significant differences in the effectiveness of Logotherapy in reducing mathematics anxiety between male and female students. It was recommended that educational institutions in Nigeria should consider incorporating Logotherapy or similar psychological interventions as part of their support systems to help students manage mathematics anxiety.

Keywords: Logotherapy, Junior secondary students, Mathematics anxiety, Performance

Introduction

Mathematics seems to be one of the most important subjects in Nigerian education from primary to tertiary institutions. In the school system, it has been observed to be among the core subjects, students must register but unfortunately, some students even from primary schools are seen performing poorly in it. This subject plays an important role in forming the basis of all other sciences which deal with the material substance of space and time. Mathematics is described as the fundamental for science and it is that branch of science that uses numbers and symbols. Numbers and symbols are arranged using systematic mathematical rules. These figures and numbers sometimes create shock; fear or shivering and even fast heart beat among some students, causing the learners to be exhibiting anxiety towards the subject. The shock, fear, shivering and fast heartbeat of the students that arise as a result of mathematics figures or symbols signifies abnormal behaviour which may affect their whole lives if not eliminated. Abnormal behaviours are of concern to counsellors and psychologists. These behaviours are termed abnormal because they deviate from the general norms and values and also are capable of distracting the academic line and performance of the students now and in future.

This fear and tension towards mathematics subject is known as mathematics anxiety which is a specific anxiety. Mathematics anxiety seems to have contributed to psychological problems some students seem to be experiencing today, in their choice of career, gaining admission into tertiary institutions and getting gainful employment. However, Geist (2010) states that negative attitudes towards mathematics are serious obstacles for young people in all levels of schooling today and he feels that it should be looked into by experts in order to ameliorate its effects among students. Mathematics anxiety is an emotional situation relating to an individual's inability to do mathematics, independent of skill which can cause neurotic difficulties at last if not treated (Ma & Xu, 2009). In some cases, according to Ma and Xu, the emotional situations caused by mathematics anxiety will result to the student feeling sick, having a fast heart palpitation, dry mouth, and inability to speak or think clearly, a sense of detachment, dizziness and sometimes breathlessness. These effects seem to have been affecting the assimilation level of some junior secondary school students in a mathematics lesson thereby making it difficult for them to understand the basic techniques used in solving even the simple mathematics problems in the class. Ifeagwazi (2008) opines that anxiety is seen as stress, tension and strain brought into one's body and mind as unpleasant emotion, characterised by terms like apprehension, worry, dread and fear which threatens the well-being of the individual, while Freedman (2013) defines it as emotion characterised by an unpleasant state of inner turmoil which is often accompanied by nervous behaviour. Anxiety seems to be a normal reaction of humans to stress and difficulties in life but Smith (2008) opines that when it becomes excessive, it falls under the classification of behavioural problem.

Ustun (2011) infers that children within the ages of 12 to 17 years are prone to having one type of anxiety or the other which implies that some secondary school children within these age brackets are likely having mathematics anxiety. However, the causes of these problems of mathematics anxiety and wrong mindset about mathematics are not yet clearly determined but Baloglu and Kocak (2013) suggests that some likely factors that are behind mathematics anxiety include: friends who say that mathematics is too difficult to understand, parents' comments to the hearing of their siblings that they see mathematics as highly complicated and also teachers who are putting bias to the students by making them believe that there is a connection between the marks they get in the mathematics class and self-confidence. All these seem to be triggering the mathematics anxiety in some of the students and some of them have device ways of avoiding mathematics lessons. As the researchers observes, some of the students see their mates as threat in the class drills while some seem to lose their appetite for food as a result of their anxiety towards mathematics. The effect of all these avoidances of mathematics as a result of anxiety is that the concerned students will be failing mathematics examinations or tests as well as getting poor grades.

Obodo (2014) in determining whether levels of mathematics assimilation relate to gender, opines that a student's level of assimilation in mathematics is sometimes relative to gender. Anchor, Imoko and Ajai, (2010) assert that girls are believed to be more anxious than their male counterparts. Ogugua (2016) sees anxiety as being problematic especially for women while Anchor et al (2010) notes large sex differences in university level mathematics courses and opines that female dropout rates from

mathematics classes as a result of tension and apprehension they witness in the course of studying the subject almost double those for males. Also, Bielock; Gunderson; Ramirez and Levine (2010) adduce that mathematics anxiety is often most directly related to women as younger female scholars are thought to develop anxiety towards mathematics and sciences while they become more interested in social relations in their teen years.

Besides, gender differences in the level of anxiety, learning environment are recognized as an important focus in research (Udeze, 2018). Boys and girls have psychological feelings of different degrees of intelligence and creativity. Culturally, boys and girls have peculiar ways of behaving and thinking. 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. Behaviourists like Ivan Pavlov (1927), Joseph Wolpe (1973) and Sigmund Freud have adopted the following techniques towards eliminating anxiety among individuals: exposure therapy, systematic desensitization, self-management, modelling and reinforcement in reducing anxiety of some other kinds, and they seem to have eliminated anxiety to some extent.

However, the present study wants to adopt logotherapy techniques towards eliminating mathematics anxiety among junior secondary school students. The choice of logotherapy techniques is motivated by its effectiveness in handling maladaptive behaviours (Johnson & Schrest 2016, and Schnoder & Rich 2016). Besides, individuals are capable of controlling their behaviour if taught how to and when this is done, the result can be more lasting than when the control measures are being applied by external person. Logotherapy is a psychological principle developed by neurologist and psychiatrist Victor Frank for exposing clients' problems and potentials to them and assisting them to find meaning and exert control over their lives. It is based on the principle that all human beings have the ability to objectively construct meaning and develop new perceptions to situations they find themselves (Szabo & Baji, 2025).

Statement of the Problem

The issue of mathematics anxiety among secondary school students has been a source of worry among the stakeholders in Education. Mathematics anxiety if left unchecked will make some of the secondary school students especially the science inclined ones not to be satisfactorily and gainfully employed in future especially that Nigeria is in crisis economically. Also, mathematics is a must to studying the needed science courses that will help students towards gainful employment. Also, gaining admission into any tertiary institution in the country will be difficult for them because it requires that a candidate must have a credit level pass in mathematics. Mathematics anxiety is a behavioural problem therefore it will need the attention of the guidance counsellors and psychologists if these students will function creditably well in their future areas of course of study and career. Evidence from previous studies have shown that behavioural modification techniques can be effective in the management of anxiety responses (Harbor-Peters 2000, Geist 2010 and Azuji, Anyamene & Nwokolo 2015), although none has been applied on managing mathematics anxiety among junior secondary school students.

Many therapies exist that may be used for managing or treating mathematics anxiety among students. Can Logotherapy be used as a technique for treatment and/or management of mathematics anxiety among junior secondary school students? specifically, can Socratic dialogue and modification of attitude techniques be used for treatment and/or management of mathematics anxiety among junior secondary school students? Can Socratic dialogue technique be used in conjunction with modification of attitude technique to treat mathematics anxiety among junior secondary school students? If yes, what can be the likely comparative effect? These dissatisfying situations and doubts constitute the problems of this study.

Purpose of the Study

The general purpose of this study is to investigate the effects of logotherapy technique in the treatment of Mathematics anxiety among junior secondary school students in Owerri Education Zone I of Imo State. Specifically, the study sought to:

1. determine the mean response to Mathematics anxiety of students in the Logotherapy technique and control groups in the post-treatment test;
2. ascertained the mean response scores in the post-treatment tests of students in the treatment (Logotherapy technique) by gender subgroups;

Research Questions

The following research questions guided the study.

1. What is the mean response to Mathematics anxiety of students exposed to Logotherapy technique and control groups in the post-treatment test?
2. What are the mean response scores in the post-treatment tests of male and female students exposed to Logotherapy technique?

Hypotheses

The hypotheses stated below were tested at 95% level of confidence to guide the study.

1. The mean response to Mathematics anxiety of students exposed to Logotherapy technique and control groups in the post-treatment test do not differ significantly.
2. There is no significant treatment (Logotherapy technique) by gender interaction effects on the four subgroups in the post-treatment test.

Method

The study adopted quasi-experimental research design, which involves pre-test treatments, control, post-test quasi-experimental research design. The study involves a treatment group (Logotherapy technique) and control group. It was a field experiment in which the researchers manipulated Logotherapy technique under carefully controlled conditions as the situation permits and there was random assignment of subjects to the groups. The study was carried out in Owerri Education Zone 1 of Imo State. The population of the study was 32,763 students in junior secondary school (JSS) classes in the 2022/2023 academic session from the 79 public Secondary Schools in the Owerri Education Zone I with a sample size of 44 students using simple random sampling technique. The instrument for data collection was Abbreviated Mathematics Anxiety Scale (AMAS) developed by Hopko, Mahadevan, Bare and Hunt (2003) but was revalidated in Nigeria by Adebule (2003). AMAS has been adapted to Nigerian context and has been used extensively in Nigeria (Ogugua 2016). The AMAS is structured on a five (5) point rating scale ranging from: 1=Very Low Anxiety (VLA), 2 = Low Anxiety (LA), 3 = Moderate Anxiety (MA), 4 = High Anxiety (HA) and 5 = Very High Anxiety (VHA).

Results

Research Question One: What is the mean response to Mathematics anxiety of students exposed to Logotherapy technique and control groups in the post-treatment test?

Table 1: Mean Response Scores of Students Exposed to LTT and CG in the Pre-treatment and Post-treatment Tests

Group	Pre-treatment			Post-treatment	
	<i>n</i>	$\bar{X}$	<i>Std</i>	$\bar{X}$	<i>Std</i>
LTT	25	32.84	5.14	13.56	3.15
CG	19	39.00	3.64	36.89	4.14
Mean Difference		-6.16		-23.33	

Table 1 shows that the mean response scores of students exposed to Socratic Dialogue Technique (LTT) and the Control Group (CG) in the pre-treatment tests are 32.84 and 39.00 respectively. The mean response score of the students in the CG group is higher than that of the students in LTT group. With the initial mean difference of 6.16, the students exposed to CG seems to have more Mathematics anxiety in the pre-treatment than those exposed to LTT. However, this initial difference in the mean response scores of the students in the two groups at pre-treatment was adjusted by ANCOVA F-ratio. On the other hand, in the post-treatment test, the mean response scores of the students exposed to Socratic Dialogue Technique (LTT) and Control Group (CG) are respectively 13.56 and 36.89. Also, the standard deviations of the scores of students in LTT and CG groups are respectively 3.15 and 4.14. The mean response score of the students exposed to LTT is appreciably lower than the mean response score of their counterparts in the CG. The mean difference between Mathematics anxiety response scores of students in the LTT and CG groups in the post-treatment is 23.33. The statistical test below will show if this mean difference is significant. The low standard deviation of the scores in the LTT and CG groups indicates that the scores of the students are clustered around the mean.

Hypothesis One: The mean response to Mathematics anxiety of students exposed to Logotherapy technique and control groups in the post-treatment test do not differ significantly.

Table 2: ANCOVA Summary Table for Testing Hypothesis One

Tests of Between-Subjects Effects

Dependent Variable: Post_Test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	6103.222 ^a	4	1525.806/8.230	185.396	.000	.950	
Intercept	47.048	1	47.048	5.717	.022	.128	
Pre-Test	213.491	1	213.491	25.941	.000	.399	
Treatment	4000.487	1	4000.487	486.102	<.001	.926	
Gender	1.914	1	1.914	.233	.632	.006	
Treatment * Gender	10.777	1	10.777	1.309	.259	.032	
Error	320.960	39	8.230				
Total	31006.000	44					
Corrected Total	6424.182	43					

a. R Squared = .950 (Adjusted R Squared = .945)

Table 2 shows that the calculated F-ratio 486.086 is significant at the observed probability value of <0.001, which is less than the hypothesized probability value 0.05. The treatment line shows that the two groups differ on the adjusted means. The difference is unlikely to have arisen by sampling error, assuming the null hypothesis to be true. Based on these comparisons, we fail to accept the null hypothesis one which states that “The mean response to Mathematics anxiety of students exposed to Logotherapy technique and control groups in the post-treatment test do not differ significantly.” and instead accept the alternative hypothesis. Hence, the mean response scores to Mathematics anxiety of students exposed to Logotherapy technique and control group in the post-treatment test differed significantly.

Research Question Two: What are the mean response scores in the post-treatment tests of male and female students exposed to Logotherapy technique?

Table 3: Mean Response Scores in the Post-treatment Test of Students in the Treatments by Gender Subgroups

Gender	LTT			CG		
	<i>n</i>	$\bar{X}$	<i>S</i>	<i>n</i>	$\bar{X}$	<i>S</i>
Male	14	13.36	2.95	10	36.20	4.24
Female	11	13.82	3.52	9	37.67	4.12

The mean response to Mathematics anxiety of male students exposed to LTT and CG, as presented in Table 3, are 13.36 and 36.20 respectively. The male students in LTT group has mean response to Mathematics anxiety lower than that of their counterparts in CG group. For the female students exposed to LTT and CG their respective mean response scores are 13.82 and 37.67. The mean response to Mathematics anxiety of female students exposed to LTT is lower than that of the female students exposed to CG. However, when compared across gender, the male students in LTT group have mean response score slightly lower than that of their female counterparts in the same group.

Hypothesis Two: There is no significant treatment (Logotherapy technique) by gender interaction effects on the four subgroups in the post-treatment test.

Table 4: Summary ANCOVA F-ratio and p-value Table for the Test of Hypothesis Two

<i>MS</i>	<i>df₁</i>	<i>df₂</i>	<i>F_{cal}</i>	<i>p</i>	<i>F_{crit}</i>	<i>Decision</i>
10.777	1	39	1.309	0.259	3.92	H ₀₂ is accepted

3.

Table 4 above shows the calculated F-ratio for interaction effect of gender and treatment on mean response to Mathematics anxiety is 1.309. This very is significant. This implies that gender has significant interaction effect. So, the hypothesis is rejected. The mean scores in table 3 equally indicate slight difference between male and female students.

Discussion

Effects of Logotherapy Technique (LTT) on Mathematics Anxiety of Junior Secondary School Students in the Post-treatment Test

The study found that using Logotherapy Technique (a therapeutic approach developed by Viktor Frankl) had a positive effect on students' mathematics anxiety. In other words, when students were exposed to this technique, it helped alleviate their anxiety related to mathematics. The researcher used a measure of mathematics anxiety, and the mean (average) response of students who underwent Logotherapy Technique was analyzed. This mean response was found to be below a benchmark value of 21.10. This benchmark represents a level of mathematics anxiety that is considered problematic or significant. In simpler terms, students who received Logotherapy Technique reported lower levels of mathematics anxiety compared to this benchmark. The study also compared the mean response to mathematics anxiety in the post-treatment test with the mean response in the pre-treatment test. The pre-treatment test likely assessed the students' mathematics anxiety before they received Logotherapy Technique. The findings indicated that after undergoing the technique, the students' mean response to mathematics anxiety had decreased. This suggests that the technique was effective in reducing mathematics anxiety compared to their initial levels.

The study found that there was a statistically significant difference in the mean response scores to mathematics anxiety between the Logotherapy Technique group and the control group in the post-treatment test. In other words, students who received the Logotherapy Technique had lower average scores on the mathematics anxiety assessment compared to the control group. This difference suggests that the Logotherapy Technique was effective in reducing mathematics anxiety.

The reason for this significant improvement in Mathematics anxiety by Logotherapy Technique is not farfetched. Logotherapeutic is a technique in which the therapist uses the clients' own words as a method of self-discovery into his/her problems, in this case Mathematics anxiety. It is believed that by listening attentively to what the client says, the therapist can point out the specific pattern of word solution to the client's problem. This will enable them realize that answers to their problems lie not outside but within themselves. The technique when properly utilized, facilitate change and modify behaviour through deep psychological, emotional and physical awareness. This finding shows that school guidance counsellor can adopt Logotherapy Technique to help students with Mathematics anxiety. These findings are in line with the finding of Henrion (2004), Kang (2019) and Wakawa, (2015) who found Logotherapy Technique as an effective technique in the reduction of anxiety among students. However, the study by Wakawa was on substance abuse, while that by Kang was on Alcohol abuse.

Treatment (Logotherapy Technique) by Gender Interaction Effects on Mathematics Anxiety of Junior Secondary School Students

The findings of the study provide insights into the effect of the Logotherapy Technique (LTT) on mathematics anxiety among male and female students, as well as the interaction between gender and treatment effects. The study found that both male and female students who were exposed to the Logotherapy Technique had lower mean scores on their responses to mathematics anxiety compared to their counterparts in the control group. In other words, the LTT group experienced a reduction in mathematics anxiety regardless of gender. When comparing male and female students within the Logotherapy Technique group, it was noted that the mean response score for male students was slightly lower (indicating lower anxiety) than that of female students. This suggests that, within the LTT group, male students tended to benefit slightly more from the technique in terms of reducing mathematics anxiety. Mathematics anxiety reduced slightly better in male students than female students. This implies that male improved better. It means that gender has an interactive effect.

In summary, the study suggests that the Logotherapy Technique is effective in reducing mathematics anxiety among both male and female students, and there is no significant difference in its effectiveness based on gender. This finding reinforces the idea that the Logotherapy Technique can be used as a treatment for students experiencing mathematics anxiety, regardless of whether they are male or female, and aligns with the findings of earlier research in this area. The study's findings are consistent with the results of previous studies conducted by Kang (2019) and Achonu (2019), which also found that the Logotherapy Technique had a positive impact on students' behavior, including mathematics anxiety, and that gender did not appear to be a significant factor in determining the effectiveness of the technique.

Conclusions

In conclusion, the study examining the effect of the Logotherapy technique on mathematics anxiety among junior secondary school students in Imo State, Nigeria, has provided valuable insights into the potential benefits of psychological interventions in educational settings. The study revealed that the Logotherapy technique had a positive effect on reducing mathematics anxiety among the participating students, with the added benefit of a positive retention effect observed over time. This implies that not only did the Logotherapy intervention initially alleviate anxiety, but its effects persisted, suggesting the potential for lasting improvements in students' overall mental health.

Recommendations

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

1. Given the positive effects observed in the study, educational institutions in Nigeria should consider incorporating Logotherapy or similar psychological interventions as part of their support systems to help students manage mathematics anxiety.
2. The guidance counsellors should feel free to adopt Logotherapy Technique in the treatment of Mathematics anxiety among secondary school students irrespective of their gender, since the treatment technique proved not be biased towards any of the gender.

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