

Relationship between Math Anxiety Level and Negative Beliefs in Problem Solving Competencies Of B.Ed.Trainees

Sangita Raghupatrao Bihade

Assistant Professor Shri Shivaji College Of Education, Amravati, Maharashtra, India

Abstract

This study was undertaken in Shri Shivaji College of Education, Amravati, teacher education institution by a assistant professor of mathematics method working with students on a teacher training course. Its aim was to explore the existence of mathematics anxiety in students and how such anxiety may affect their ability of recalling formulae in problem solving competency and teaching. Investigation was carried out through review of literature and consideration of questions subsequently arising, linked to collection and analysis of questionnaire data from a sample of students of B.Ed. admitted in the institution in academic year 2013-2014.

This study took place in teacher education institution where some students presented with negative attitudes towards mathematics, potentially affecting their recalling ability in problem solving. Quantitative research was undertaken to investigate this, using questions generated from a review of literature. The intention was to elicit students' attitudes towards mathematics anxiety and explore how their attitude affects their formulae recalling competency in problem solving might be affected. Math anxiety was directly related with recalling ability. The variation in math performance among the highly math---anxious provides an opportunity (1) to understand the reasons for the negative relation typically seen between math---anxiety and math competence, and (2) to shed light on how this relation is ameliorated. This paper highlights on effect of math anxiety on formulae recalling in problem solving competency of B.Ed. trainees.

The purpose of this research was to investigate math anxious attitudes toward recalling mathematical formulae of B.Ed. trainees. Mathematics achievement is a top priority in the new millennium. Data on perceived notions of B.Ed. trainees' attitude toward mathematics was collected. The sample data consisted of 92 teachers that were completed math anxiety attitude scale. Hypotheses were designed to test the information that was generated. A paired sample t-test, Test of between Subjects Effects, Frequencies, Descriptive Data were used as statistical analyses to measure responses. The results suggested there was a statistical significant difference in the perception of math anxious B.Ed students than non-anxious math students. When comparing the mathematics performance of the genders, teachers reported that males out performed females and experienced less anxiety.

KEYWORDS: Math anxiety, recalling ability, formulae, problem solving competency, negative beliefs.

INTRODUCTION:

Mathematics is the study of numbers, and counting, and measuring, but that is only the beginning. Mathematics involves the study of number patterns and relationships, too. It is

also a way to communicate ideas, and perhaps more than anything, it is a way of reasoning that is unique to human beings. Mathematics is divided into pure or theoretical mathematics, and applied mathematics. Applied mathematicians focus on how to apply mathematical principles to questions people have about the world around them and other practical problems (The New Book of Knowledge, 2006). Although basic math skills are important for everyday life, many people report feeling anxious when faced with the prospect of doing math. *Mathematics anxiety* is characterized by feelings of tension, apprehension, and fear about performing math and is associated with delayed acquisition of core math and number concepts and poor math competence (Richardson & Suinn, 1972). Math---anxiety is clearly an impediment to math achievement (Ashcraft & Ridley, 2005; National Mathematics Advisory Panel, 2008). However, not all people high in math---anxiety perform equally poorly in math.

Mathematics anxiety and student achievement have been a major focus of many research studies. Math achievement is a very crucial issue that high school students face today. For over two decades, math anxiety has been a serious issue for the educational system and its educators. The problem of anxiety among students has become progressively worse. Kazelskis (2000) asserts that “Not even highly able students are immune to this problem. While there is considerable interest in the treatment of math anxiety, the nature of this mathematics anxiety, its origins, and methods to alleviate it continues to be somewhat elusive”. Mathematics is more than a simple subject; it is a language that helps us describe ideas and relationships drawn from our environment. Mathematics is a tool of science and technology that enables people to explore concepts with idealized models before trying them in the real world (Clark and Fulton, 2003). Despite the curricular reforms of the 1980s, the “algebra for all” movement of the 1990s, and the arrival of No Child Left Behind in the 2000s, there is still great variety in teaching mathematics in schools across the United States. Teachers’ perceptions of their students and what those students are capable of learning, curriculum, instruction, and the assessment that teachers offer is on the front burner of education policy (Walker, 2006). Students in mathematics classes should be taught the fundamental skills they need, and be exposed to interesting mathematics problems linked to life experiences. Math anxiety is an intense emotional feeling of anxiety that people have about their ability to understand and do mathematics. People who suffer from math anxiety feel that they are incapable of doing activities and classes that involve math. Some math anxious people even have a fear of math; it's called math phobia. The incidence of math anxiety among college students has risen significantly over the last decade. Many students have even chosen their college major in the basis of how little math is required for the degree. Math anxiety has become so prevalent on college campus that many schools have designed special counseling programs to help math anxious students. Math anxiety is an emotional, rather than intellectual, problem. However, math anxiety interferes with a person's ability to learn math and therefore results in an intellectual problem. Math anxiety does not have a single cause. Often math anxiety is the result of a student's negative or embarrassing experience with math or a math teacher in previous years. Such an experience can leave a student believing him or herself deficient in math ability. This belief can actually result in poor performance, which serves as confirming evidence to the student. This phenomenon is known as the self-fulfilling prophecy. Math anxiety results in poor performance rather than the reverse.

Competence is defined as someone's insightful readiness to act in response to the challenges of a given situation (Blomhøj & Jensen, 2006). The most important characteristic of this definition is that it makes competence headed for action. As argued Blomhøj and Jensen(2003), "action" must be interpreted broadly, as the term "readiness to act" in the definition of competence could imply a positive decision to refrain from performing a physical act, or indirectly being guided by one's awareness of certain features in a given situation.

There is considerable evidence that many B.Ed. trainees come to their statistics unit with significant levels of anxiety about mathematics. Unless these anxieties are addressed, trainees may fail to remedy gaps in their subject knowledge, may fail to learn the required pedagogical skills and may pass their anxieties on to the children they teach. This suggests that these people are a significant link in the chain that perpetuates mathematical anxiety. The fact that trainees' attitudes to mathematics change considerably during their statistics year represents an opportunity for training providers to reduce anxiety levels. At our institution we have been running a longitudinal study seeking to track the changing attitudes towards mathematics of our cohorts of trainee teachers and to explore the reasons for any changes through interviews with groups of them. The findings presented here provide a glimpse into the mathematical world of trainee teachers and reveals some interesting (and often surprising) factors which may help other providers of initial teacher education to reduce trainees' anxiety about mathematics in the future.

REVIEW OF RELATED STUDIES:

Math anxiety is a phenomenon that is often considered when examining students' problems in mathematics. [Mark H. Ashcraft](#), Ph.D. defines math anxiety as "a feeling of tension, apprehension, or fear that interferes with math performance" (2002). The first math anxiety measurement scale was developed by Richardson and Suinn in 1972. Since this development, several researchers have examined math anxiety in [empirical studies](#). Hembree (1990) conducted a thorough [meta-analysis](#) of 151 studies concerning math anxiety. It determined that math anxiety is related to poor math performance on math achievement tests and that math anxiety is related to negative attitudes concerning math. Hembree also suggests that math anxiety is directly connected with math avoidance.

Ashcraft(2002) suggests that highly anxious math students will avoid situations in which they have to perform mathematical calculations. Unfortunately, math avoidance results in less competency, exposure and math practice, leaving students more anxious and mathematically unprepared to achieve. In college and university, anxious math students take fewer math courses and tend to feel negative towards math. In fact, Ashcraft found that the [correlation](#) between math anxiety and variables such as confidence and motivation are strongly [negative](#).

According to Ashcraft, because math anxiety can cause math avoidance, an [empirical dilemma](#) arises. For instance, when a highly math-anxious student performs disappointingly on a math question, it could be due to math anxiety, or the lack of competency in math because of math avoidance. Ashcraft determined that by

administering a test that becomes increasingly more mathematically challenging, he noticed that even highly math-anxious individuals do well on the first portion of the test measuring performance. However, on the latter and more difficult portion of the test, there was a stronger negative relationship between accuracy and math anxiety.

Objectives of the study:

- i) To search level of math anxiety in B.Ed. students.
- ii) To find out numerical ability of B.Ed. students.
- iii) To search out formula recalling competency of B.Ed. students.
- iv) To compare math anxiety level of various faculty B.Ed. students.
- v) To compare math anxiety level of math faculty students with art faculty students.

Research Questions

What is math anxiety and what causes it?

1. How does math anxiety cause students to forget how to do mathematics by using formula?
2. How does math anxiety relate to poor math performance?
3. How common is math anxiety?
4. What factors cause math anxiety?

Hypothesis of the study:

A) There was no significant difference between math anxiety level at gender level among B.Ed.students.

B) There was no significant difference between math anxiety level at faculty level among B.Ed.students.

B) There was no significant difference between math anxiety level at faculty and gender level among B.Ed.students.

A)There was no significant difference between math anxiety level and negative beliefs towards problem solving competency at gender level among B.Ed.students.

Method:

The purpose of this study was to investigate reasons of mathematical anxiety so it requires survey method. This study employed causal-comparative and descriptive research designs. Causal-comparative research design is a non-experimental research method that provides better evidence of cause and effect relationship. According to Gay (2006) causal-comparative research design determines reasons or cause for the current status of the phenomena under study.

Sample:

The participants of this study comprise 92 student- teachers in that 18- males and 74- females student teachers of Shri Shivaji College of Education, Amravati. Sample was selected purposefully method of selection for researchers competence credit.

Tools and Materials:

Research instruments

The researchers made use of the theoretical framework and the review of literature to construct the questionnaire. The self-constructed questionnaire was used to collect data from mathematics teachers. The questionnaire had the following items: teacher commitment, teacher preparations, use of learning resources, and assessment and evaluation using the four-point scale of (4) Strongly agree (3) Agree (2) Disagree (1)

Strongly disagree. The student- teachers circled the appropriate number to indicate their agreement or disagreement to the given statements.

Statistical Techniques:

For Data Analyses, The data obtained from this study was evaluated using Percentage. Descriptive statistics and correlation analysis were obtained using SPSS (Version 11) after the collation of the data. The means and standard deviations for the questionnaires and the Problems Test were calculated. A further analysis of Problems Test scores was made by comparing five groups of students of different mathematics-anxiety levels from their Mathematics Anxiety Scale scores. Each level comprised approximately 20 per cent of the total sample, with the lowest level of mathematics anxiety was designated as level 1 through to the highest at level 5. A Pearson r, product-moment-correlation analysis was conducted. A one-way-analysis of variance (ANOVA) was carried out for the Problems Test on the five mathematics-anxiety levels. For comparison t-value was calculated

Levels of Mathematics Anxiety	Problems Test (max = 20)		MathAnxiety (max = 80)	
	M.	S.D.	Mean	S.D.
Level 1 (N = 13)	15.53	3.40	39.22	9.83
Level 2 (N = 12)	14.29	3.77	40.74	8.36
Level 3 (N = 15)	14.05	3.32	42.42	10.00
Level 4 (N = 18)	13.51	3.13	45.50	9.63
Level 5 (N = 32)	13.42	3.87	49.55	10.17

among gender and faculty of student teachers.

Mean Scores and Standard Deviations (SD) for the Problems Test Scores and Test scores
Mean Scores at Five Levels of Mathematics Anxiety

The mean scores for the Problems Test ranged from 13.42 to 15.53 marks while the test anxiety ranged from 39.22 to 49.55. These results were not surprising as many teachers and researchers associate higher levels of mathematics anxiety with lower problem-solving success and higher subject-specific manifestation of math anxiety (Bandalos, Yates, & Thorndike-Christ, 1995; Brush, 1981; Hembree, 1990).

To confirm the results shown in Table that there was a decrease in the means of the Problems Test scores through the mathematics-anxiety levels, a one-way ANOVA for the Problem Test scores was carried out at a five per cent level of significance. This analysis of the Problems Test scores ($F = 7.48$, $p = 0.000$) showed that the differences between the mean scores of the five mathematics-anxiety levels were statistically significant. The relationship depicts shows that as the mathematics anxiety level increased the mean scores of the students' solving Problems Test decreased; that is, as students became increasingly more anxious, they scored lower in their Problems Test. On the whole, the

relationship suggested that low mathematics-anxious students performed better in non-routine problems than the high mathematics-anxious students.

Comparison of mean anxiety score of male and female student teachers students

group	N	Mean	S.D.	t-value	p
Male student	18	36.17	11.04	6.92	<0.001
Female student	74	40.16	11.81		

There was no significant difference between mean score of Male and female student teachers of B.Ed. They have same level of math anxiety.

Comparison of mean anxiety score of male and female student teachers of arts faculty

group	N	Mean	S.D.	t-value
Male student	12	14.87	3.11	1.45
Female student	42	14.56	3.08	

There was no significant difference between mean score of Male and female student teachers of arts faculty. They have same level of math anxiety.

Comparison of mean anxiety score of male and female student teachers of science faculty

group	N	Mean	S.D.	t-value
Male student	06	29.14	5.31	1.50
Female student	32	28.29	4.71	

There is no significant difference between mean score of Male and female student teachers of science faculty. They have same level of math anxiety.

Comparison of mean anxiety score of female of science faculty and female student teachers of arts faculty

Group female	N	Mean	S.D.	t-value
Science	32	15.08	4.01	2.73
Art	42	13.09	3.53	

There is significant difference between mean score of female students of science faculty and female student teachers of art faculty. They have difference level of math anxiety.

Comparison of mean anxiety score of male-students of science faculty and male-student teachers of arts faculty

Group male	N	Mean	S.D.	t-value
science	06	13.87	3.12	3.10
art	12	11.76	2.06	

There is significant difference between mean score of male students of science faculty and male student teachers of art faculty. They have difference level of math anxiety.

Comparison of mean anxiety score of female-students of science faculty and male-student teachers of arts faculty

Group	N	Mean	S.D.	t-value
science	32	11.23	2.54	2.59
art	12	09.21	2.01	

There is significant difference between mean score of male students of science faculty and male student teachers of art faculty. They have difference level of math anxiety.

CONCLUSIONS:

The results of this study show that there is a positive relationship between anxiety about mathematics and anxiety about RECALLING mathematics formula. The distribution of the relationship showed that the relationship occurred primarily at lower levels of anxiety about mathematics competencies. Student teachers having high levels of math anxiety have negative beliefs about numerical math competencies.

These findings suggest that student-teachers who are not anxious about math will likely not be anxious about math competency. Student teachers of arts faculty have higher level of math anxiety as compared to students of science faculty. Male student-teachers and female student teachers do not differ on math anxiety level of both faculties. The results suggested there was a statistical significant difference in the perception of math anxious B.Ed students than non-anxious math students. When comparing the mathematics performance of the genders, teachers reported that males out performed females and experienced less anxiety.

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WEBSITE VISITED:

1. <http://www.math-anxiety.com>
2. <http://www.mathacademy.com>
3. <http://homeworktips.about.com>
4. http://www.math.ohio-state.edu/students/how_to_study.html
5. <http://euler.slu.edu/Dept/SuccessinMath.html>
6. <http://mathforum.org/dr.math/> - the math forum Ask Dr. Math
7. <http://www.mathpower.com/>
8. <http://www.math.com/s>