Available online at www.elixirpublishers.com (Elixir International Journal)

Management Arts

Elixir Mgmt. Arts 35 (2011) 2843-2845

ISSN: 2229-712X

An analysis of mathematics anxiety and mathematics interest

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ARTICLE INFO

Article history:

Received: 6 April 2011;

Received in revised form:

19 May 2011;

Accepted: 26 May 2011;

Keywords

Mathematics Anxiety,

Mathematics Interest,

Mathematics Achievement,

Correlation.

ABSTRACT

The purpose of this paper is to investigate the relationship between the mathematics anxiety, mathematics interest and mathematics achievement. The sample size comprised of 78 (32 male and 46 female) undergraduate students of Bachelor of Science in Economics. The Pearson correlation analysis is used to analyze the data. The results revealed that mathematics anxiety has significant negative correlation with mathematics interest and mathematics achievement. It is also found that mathematics interest and mathematics achievement has significant positive correlation. There was a no significant gender difference found in mathematics anxiety but there was a significant gender difference in mathematics interest and mathematics achievement. Moreover, female students showed a higher level of mathematics interest and mathematics achievement than the male students. The study reveals that the performance of the students of Economics in Mathematics is influenced by the mathematics anxiety.

ntroduction

Mathematics anxiety is defined as a feeling of tension, apprehension or fear that interferes with math performance. Richardson and Suinn (1972) stated mathematical anxiety as, "feeling of tension and anxiety that interfere with manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations". According to Ashcraft (2002), Mathematics anxiety is present in many learners regardless of age, level of mathematical knowledge, gender and ability. According to Luo (2009), Mathematics anxiety is a kind of disease which refers to such an unhealthy mood responses which occur when some students come upon mathematics problems and manifest themselves as being panicky and losing one's head depressed and helpless, nervous and fearful, and so on. This certain disease is often accompanied by some physiological reactions like perspiration of palms, tightening the fists, vomiting, dry lips and pale face. With these symptoms, students experience a feeling of self threat in mathematics learning, resulting in the loss of interest and confidence in mathematics learning.

Literature Review

Many students who suffer from mathematics anxiety have little confidence in their ability to do mathematics and tend to avoid mathematics course (Garry, 2005). Mathematics anxiety is the out come of low self esteem and the fear of failure, which causes problem for processing the incoming information as well as the previously learned information for problem solving. Such students avoid mathematics whenever and wherever possible.

Mathematics anxiety has been found to have a negative relationship with mathematics performance (Hambree, 1990). According to Ashcraft and Kirk (2001), the correlation between mathematics anxiety and academic performance is inversely significant. Karimi (2009) found that mathematics anxiety has significant negative correlation with mathematics performance but no significant correlation is detected with academic hardness. His sample size comprised of 284 10th grade high school students. Ho et al. (2000) found that the affective factor of mathematics anxiety is significantly related to mathematics achievement in the opposite direction. Their study focused on mathematics anxiety, comparing its dimensions, levels and relationship with mathematics achievements across samples of 6th grade students from China, Taiwan and United States. According to Betz (1978), mathematics anxiety is prevalent among college students. Lazarus (1974) suggested that the roots of mathematics anxiety are in the elementary and secondary levels.

A high level of anxiety is associated with a lower level of performance. Tapia (2004) found that students having little mathematics anxiety scored significantly higher than the students with high mathematics anxiety

A lack of confidence when working in mathematical situations is the cause of math anxiety (Stuart, 2000). According to Ashcraft & Faust (1994), highly math anxious students will be less fluent in computation, less knowledgeable about mathematics and less likely to have discovered special strategies and relationship within the mathematics domain.

Several studies (Hembree 1990; Ashcraft 2001; Luo; 2009) have been done so far related to mathematics anxiety and mathematics performance at school level but there is need to study the Mathematics anxiety at undergraduate level as well. In the present study, the researcher is intends to find out the relation between mathematics anxiety, mathematics interest and mathematics achievement.

Hypothesis

The hypotheses of this study are as follows:

1. There is a significant relationship between mathematics anxiety, mathematics interest and mathematics achievement.
2. There is a significant difference between male and female students in mathematics anxiety, mathematics interest and mathematics achievement.

Objectives

The objectives of the study are:

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1. To examine the relationship between levels of mathematics anxiety, mathematics interest and mathematics achievements among the students of Bachelor of Science in Economics (BS Economics) at Comsats Institute of Information Technology, Abbottabad Campus.
2. To examine the effects of gender on students levels of mathematics anxiety, mathematics interest and mathematics achievements.

Method

Sample

The participants of this study comprise of 78 students of BS Economics program ranging from semester one to seven 2010 at Abbottabad, Pakistan. The sample includes 32 male and 46 female students. These students belong to various cities of Pakistan.

Instrument

The instruments used in this study are as follows:

Mathematics Anxiety: This questionnaire was developed by Tapia and Marsh 2004. The same questionnaire was used with slight modification for this study. It contained 10 items by using a Likert scale with a range of strongly disagrees to strongly agree. A total score is calculated by assigning a value of 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree) to each item and then adding the values. The possible range of score is 10 to 50. A high score on mathematics anxiety indicates a high level of mathematics anxiety and vice versa.

Mathematics Interest: This questionnaire was developed by Tapia and Marsh 2004. The same questionnaire was used with slight modification for this study. It contained 10 items by using a Likert scale with a range of strongly disagrees to strongly agree. A total score is calculated by assigning a value of 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree) to each item and then adding the values. The possible range of score is 10 to 50. A high score on mathematics interest indicates a high level of mathematics interest and vice versa.

Mathematics Achievement: The marks were obtained from student's last sessional examination in the university. All the data was analyzed through SPSS software.

Results and Discussion

According to the hypothesis of the study, the analysis of the data was divided into two parts. At first the relationship between three variables, mathematics anxiety, and mathematics interest and mathematics achievements was evaluated and in the second, the gender difference between these three variables was analyzed. The correlation between mathematics anxiety, mathematics interest and mathematics achievements is presented in table 1. Through the statistical results of table 1, the correlation between mathematics anxiety, mathematics interest and mathematics achievements is statistically significant negative and the correlation between mathematics interest and mathematics achievements is statistically significant positive. The correlation coefficient between Mathematics anxiety and mathematics interest is -0.728, the correlation coefficient between mathematics anxiety and mathematics achievement is –0.379 and the correlation coefficient between mathematics interest and mathematics achievement is 0.46.

The investigation on the means score of the males and females indicate that the students of Bachelor of Science in Economics has moderate level of mathematics anxiety (Mean = 24.68, SD = 8.32), mathematics interests (Mean = 32.77, SD = 10.30) and mathematics achievements (Mean = 31.45, SD = 10.66). There is a significant relationship between three variables as shown in table 2. The P- values are shown within the parentheses.

The influence of gender difference on mathematics anxiety, mathematics interest and mathematics achievement is presented in table 3. The investigation on the means score of the males and females indicate that the both have similar level of mathematics anxiety. (Mean= 24.75) for male and (Mean= 24.63) for female. There is significant difference between male and female students on mathematics interest. (Mean= 31.78) for male and (Mean= 33.46) for female. Also there is a significant difference between male and female students on mathematics achievements. (Mean= 24.5) for male and (Mean= 36.28) for female.

The results of the study revealed that there is a significant negative relationship between the mathematics anxiety & mathematics achievement and mathematics anxiety & mathematics interest. This implies that the students who have a high level of mathematics anxiety performed poorly in mathematics achievement and who have low level of mathematics anxiety performed high scores in mathematics achievement. The results are consistent with the previous findings of Hembree (1990) and Ashcraft (2002). Moreover, the results show that the students who have high level of mathematics anxiety had a low level of mathematics interest and vice versa (Luo, 2009).

Furthermore, there is a significant positive relationship between mathematics interest and mathematics achievements. It means that the students who have a high mathematics interest tend to perform high scores in mathematics. These results are related with the previous findings of the study conducted by Luo (2009).

According to second hypothesis of the study, the results revealed that there is no significant gender difference on the scores of mathematics anxiety, while there is a significant gender difference on the scores of mathematics interest and mathematics achievement. The results contradict the previous findings. It means that the female students of the Bachelor of Science in Economics, having same level of mathematics anxiety have higher level of mathematics interest and mathematics achievement than the male students.

Conclusion and recommendations

The objective of the study is to evaluate the relationship between the mathematics anxiety, mathematics interest and mathematics achievement. The results showed that: Firstly, there is a statistically significant negative correlation between mathematics anxiety and mathematics achievement, secondly there is a statistically significant negative correlation between mathematics anxiety and mathematics interest, and thirdly there is a statistically significant positive correlation between mathematics interest and mathematics achievement. It is also found that there is no significant gender difference on the scores of mathematics anxiety, while there is a significant gender difference on the scores of mathematics interest and mathematics achievement. In the light of the above mentioned results, it is concluded that the mathematics anxiety influences the performance of the students in mathematics and affects the student's interest in mathematics. Thus, to reduce mathematics anxiety and develop mathematics interest it is suggested that teachers should use different kinds of techniques and strategies like Drill, Group work etc. in their teaching learning process so that students must participate efficiently and effectively.

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Table 1

	Mathematics Anxiety	**Mathematics Interest**	**Mathematics Achievement**
Mathematics Anxiety	1.000	-0.728 (0.000)	-0.379 (0.001)
Mathematics Interest	-0.728 (0.000)	1.000	0.460 (0.000)
Mathematics Achievement	-0.379 (0.001)	0.460 (0.000)	1.000

Table 2

	N	Mean	Standard. Deviation (SD)	Standard Error Mean	t-values	Sig.
Mathematics Anxiety	78	24.68	8.32	0.94	26.19	0.000
Mathematics Interest	78	32.77	10.30	1.17	28.07	0.000
Mathematics Achievement	78	31.45	10.66	1.20	26.06	0.000

Table 3

	Gender	**Total= n**	**Mean**	**Std. Deviation**
Mathematics Anxiety	Male	32	24.75	6.96
	Female	46	24.63	9.22
Mathematics Interest	Male	32	31.78	10.69
	Female	46	33.46	10.10
Mathematics Achievement	Male	32	24.5	9.59
	Female	46	36.28	8.52