Comparative investigation of mathematics anxiety and learning mathematics in male and female students of distance education system

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Abstract

The research aimed to investigate mathematics anxiety and learning mathematics in male and female of distance education university. Participants (N=118 men and 127 women) were randomly selected and responded to Plake & Parker's mathematic anxiety rating scale _ revised (PPMARSR). Total scores of general mathematics were used to assess of learning mathematics. Findings showed males got more scores in assessment math anxiety than females, and also males got more scores in learning mathematics than females. Mathematics anxiety in distance education system needs distance learning and usually without direct and face to face attendance of teacher. So, these universities should plan to increase positive attitudes towards mathematics, especially with attention to gender differences.

Keywords: mathematics anxiety, distance education, students

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1. Introduction

The study of the resources of anxiety shows that math anxiety is a special social anxiety or phobia that could endanger the students' interest in mathematics, and acts as a limiting factor for educational and professional opportunities. Math anxiety means an emotional oriented reaction that leads to the students' mind freezing when face math problems or when the test is given (Slavin, 1991., Lorenz, 1993, quoted from Ramezani, 2006). This may be due to fear of failure and loss of self-concept in school activities so that the problems at the beginning of learning act like an obstacle in applying skills and math abilities or using knowledge when trying to display information. Math anxiety has been universally recognized as a non-intellectual factor that impedes math achievement. Some students who perform poorly on math assessments have a full understanding of the mathematical concepts being tested; however, their anxiety interferes with their ability to solve mathematical problems (Sparks, 2011; Hellum-Alexander, 2010; Ashcraft & Krause, 2007; Cavanaugh, 2007; Tsui & Mazzocco, 2007 cited by Blazer, 2011). Math anxiety causes people to underestimate their real ability. According to cognitive approach, this reduces ability and working memory performance in learning math (Ashcroft & Moore, 2009). High math anxiety causes that the students avoid the situations in which they solve math problems (Ashcroft, 2002). The students who have difficulty in learning math and experience math anxiety, have poor attitudes about math and have low performance in the classroom (Baton, 2010 & Bakston, 1981). According to research of Alam-al-Hoda (2002) high anxiety in math class is as a dangerous and very important phenomenon with high influence, and believe that strong emotion (such as math anxiety) can cause declining reasoning ability and deficiencies in individuals' useful performance and implicate him in invalid distance. Many factors play role in anxiety, such as: characteristics, attitude to mathematics, ineffective teaching methods and social-economical situation. Romano, Bapchyshyn, Pagany and Cohen (2010) showed that emotional behaviour especially hyperactivity, impulsivity, anti-social behaviour and anxiety can be the predictor of performance in mathematics. Also, awareness of metacognitive knowledge helps individuals to solve mathematical problems effectively and decrease their anxiety (Homayuni & Alavi, 2012). Teaching reading strategies such as cognitive and metacognitive will ease mathematical learning process (Behzadi, HosseinzadehLotfi, Mahboudi, 2014). Employing the "KWL (Know-Want-Learn) strategy" in 6th grade mathematics can be effective in increasing math achievement and metacognition skills, while it was no efficient than the traditional method regarding the reduction of anxiety (Tok, 2013). With controlling the effect of math anxiety, working memory capacity can have more effect on students' mathematical problem solving who studied their lessons in e-learning method (Daneshamooz, Alamolhodaei, Darvishian, 2012). Normal personality development is also an effective factor in increasing math performance (Homayuni, 2011). Brush study's (1978) showed that women compared with men have higher level score of math anxiety rating scale. Although girls allocated more effort to study and were perceived as receiving more support, boys excelled in many mathematical learning-related domains (Chen, Chen, Lee, Chen, Keith, 2013).

Social behaviours and attitudes about a course can be involved in learning a particular lesson. The insight of math teachers and coaches toward learners' emotional and mental states are important to choose the appropriate educational method and proper class activities that provides learners' desirable participation. So, the present study aims to examine math anxiety and math performance in men and woman in distance education university students. Understanding individuals' differences associated with learning specially in the area of gender can help practitioners and experts in instructional planning, written text codification according to sex, increasing learning and academic performance, and reduction of students psychological problems in the area of math learning and school drop reduction.

2. Methodology

This research is a descriptive-correlation research in which the relation among the variables has been investigated without making any changes in them. The research is a field study and the data were gathered by means of a questionnaire.

2.1. Statistical Population, Sample, and Sampling Method

Statistical population in this study included all the students of distance education university system that are educating in this university and have spent minimum 4 semesters. Random sampling was used to select 245 students (127 female students and 118 male students) were chosen.

2.2. Instrument

Parker and Plake's (1982) Revised Mathematics Anxiety Rating Scale (RMARS) was used to measure mathematics anxiety. 24-item version of Mathematics Anxiety Rating Scale (MARS) was used to assess statistics or mathematics course-related anxiety. Responses to the RMARS statements range from 1 (causes little anxiety) to 5 (causes high anxiety). Higher scores indicate higher levels of mathematics anxiety.The revised scale, which yielded a coefficient alpha reliability estimated at .98, was correlated .97.

2.3. Data Analysis Method

Data were analyzed by means of SPSS. Firstly, the Mean and Standard Deviation were analysed. Then, data were analyzed with descriptive methods, mean, variance and independent T test.

3. Results

Analysis was conducted using the statistical package SPSS, version 16.0 in independent T to find differences between male and female students. Analysis of means indicated significant differences among tow groups (see Table 1, 2). Findings showed there are differences between male and female in math anxiety and learning mathematics. Males got more scores in assessment math anxiety than females, and also males got more scores in learning mathematics than females.

Table 1. Mean and Std. Deviation, Max, Min of math anxiety in male and female students

Variables	Levels	Mean	Sd. deviation	Max	Min	N
Learning Mathematics	Males	13.35	5.85	0	29	245
Anxiety	Females	12.73	16.81	0	35	
Mathematics Assessment	Males	18.54	3.31	0	30	
Anxiety	Females	13.70	11.52	5	29	
Mathematics Learning	Males	14.44	1.05	12	19	
	Females	12.50	1.98	11	18	

Table 2. Analysis of means of math anxiety dimension in male and female students

Variables	Levels	Mean	Sd. deviation	T	d.f	Sig
Learning Mathematics	Males	13.35	5.85	0.38	243	0.69
Anxiety	Females	12.73	16.81			
Mathematics Assessment	Males	18.54	3.31	4.53	243	0.000
Anxiety	Females	13.70	11.52			
Mathematics Learning	Males	14.44	1.05	9.70	243	0.000
	Females	12.50	1.98			

4. Discussion & Conclusion

Many psychologists and teachers of mathematics and also cognitive psychologists are interested in math anxiety and can identify student's emotional impact and mental arousal in math and find some practical ways to control and handle them. Stress and anxiety and their interaction with learning mathematics have a special place in teaching and learning mathematics at school or even in universities. Recent studies have shown that unreasonable math anxiety (morbid anxiety) with serious cognitive obstacles in teaching and learning in addition to stop thinking and diminishing argument capacity undermines their belief in mathematics and with a negative attitude effects on learners' performance improvement. Some strategies that can be effective on removing frightening situations in doing math activities are: (Razavieh, Seif, Taheri, 2006)

1. Understanding the phenomenon of emotional stress, especially anxiety in the field of mathematical activity and trying to overcome these modes by the help of scientific strategies.
2. Teaching strategies that includes a wide range of methods, is effective in students' math performance improvement. In strategic training a type of task analysis of cognitive operations is done to make known the steps that lead to solving problem. After that the necessary skills are taught to the students in each step. When they are dominant to the detailed skills they will be taught how to put them together to solve the given problems. (Alizadeh, Hemat, Rezaidehnavi, Shojai, 2011)
3. The curriculum should be designed in such a way that they contain duties and tasks that are similar to what they face in their real life. For example, children learn telling the time gradually in their daily life. So, they should learn at school the same. Mathematical contents should be close to the materials that are used in their everyday life and there should be a relationship between them, and their common elements should be explained to the students. Also, we should try to decrease student's anxiety by using of permutation associated method. For example, mathematical contents can be replaced to their math anxiety if they are in active and dynamic class, with a kind and cheerful teacher. It means that peaceful environment without any pressure in math class is effective in math anxiety reduction.

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