The survey of relationship between the degree of mathematics anxiety in high school students and the personality characteristics of their mathematics teachers

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Abstract

The present research attempts to study the relationship between the mathematics anxiety in high school students and the personality characteristics of their mathematics teachers. From among the high school students, some 480 people were categorically chosen in accordance with their characteristics and 60 mathematics teachers were also chosen through this method. It was used the Mathematics Anxiety Questionnaire (mars) and the Neo Personality Inventory to collect the data. After data analysis, correlation coefficient, chi-square, the results were the following: There is a significant relationship between the students' mathematics anxiety and their teachers' personality characteristics.

Keywords: Anxiety, students, personality, Mathematics, Teachers

Introduction

On the learning process, providing the conditions for the learner and learning opportunity has an essential importance so that it is acquiring the best achievements. About this subject, addressing the basic subjects like mathematics is one of the cases that its necessity is obvious. It must be acknowledged that importance and the basic role of mathematics in the trend of industrial and technological evolutions is undeniable. But mathematics anxiety is one of the factors that can cause the study of mathematics and its positive factors to make difficult. Since the term mathematics anxiety has been entered into the glossary of psychology, has been passed more than four decades. At this time, although it has been obtained the clearest view on the term, but it is still a long way to fully understand the structure and its dynamics (McCrae, 1992, quoted by Shokrany, 1381). Mathematics anxiety is a psychological status that occurs when dealing with mathematical content whether in teaching and learning situation or in solving the mathematical problems and evaluating the mathematical behavior in people (Alamo’lhoda, 1379). Although it is for many years that the researchers have investigated the causes creating the mathematics anxiety, but it has not been still provided an integration approach to originate the mathematics anxiety, and the authors with different views have been pointed to a series of factors, including Shanklen (2002) has mentioned eleven factors as the factors

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influencing on the formation of mathematics anxiety that they are following: 1- parents' attitudes and behavior, 2- previous experience toward mathematics teachers, 3- poor self-concept and unsuitability feeling, 4- inability to control the failures, 5- emphasis on the practice without explanation, 6- teacher's aggressive behavior, 7- test scheduled in competition with peers, 8- non-observance of individual differences when teaching the mathematics and teaching with high speed for some students, 9- poor quality of the educational explanations, 10- exaggeration in the memorization of mathematical topics, 11- sexual orientation and the teacher's emphasis on that the girls don't need to learn the mathematics (Taghvaie, 1381). Since environmental factors have a high effect on the growth of human personality, self or self concept as one of the main aspects of human personality is influenced by environmental factors. Therefore, the objective of present research is to survey the relationship between mathematics anxiety in high school students and the personality characteristics of their mathematics teachers. In the research performed by Rahmani (1385), the following results were obtained:

- The most anxiety of the students is about mathematical exam.
- Most of the students believed that they would enjoy the teamwork.

The attitude of the students with high mathematics anxiety toward self as mathematics learners become more negative, and their belief in the mathematical shapes such that they consider the mathematics as an unattainable, unrealistic and obscure nature. All these factors cause the mathematical performance to decline. In another study conducted by Nasr Isfahani (1382) titled as "The role of mathematics self-efficacy, self-concept, anxiety and perceived usefulness in the mathematics achievement of the first year high school students (Tehran), it was surveyed the intermediary and predictive role of mathematics self-efficacy along with other psychological variables (mathematics self-concept, perceived usefulness and anxiety, and gender) using the path analysis method. Overall, the findings showed that mathematics self-efficacy is a stronger predictor than mathematics achievement compared with the mathematics self-concept, perceived usefulness and gender, and it has a significant and direct effect on mathematics achievement. In another research accomplished by Peer Hosseinloo (1382) as " the survey of the relationship between the beliefs of mathematics self-efficacy, anxiety, performance expectation in the mathematics achievement of the first year high school girls and boys in Tehran, district 2. After data analysis, the following results were obtained:

- There is a significant and positive relationship between mathematics self-efficacy and mathematics achievement. (p <0/01)
- There is a significant and positive relationship between mathematics self-efficacy and mathematics performance expectation. (p <0/01)
- There is a significant and negative relationship between mathematics self-efficacy and mathematics anxiety. (p <0/01)
- There is a significant and negative relationship between mathematics achievement and mathematics anxiety. (p <0/01)
- There is a significant and positive relationship between mathematics achievement and performance expectation. (p <0/01)
- There is a significant and negative relationship between mathematics performance expectation and mathematics anxiety. (p <0/01)
- There is a significant difference between girls and boys in all variables of mathematics anxiety, self-efficacy, expectation and achievement (p <0/01).

Research Questions:
1. Is there a significant relationship between the degree of mathematics anxiety in the girl students and the personality characteristics of their math teachers?
2. Is there a significant relationship between the degree of mathematics anxiety in the boy students and the personality characteristics of their math teachers?

Research method:
Since many behavioral variables aren't precisely measured to explain the relationship between phenomena, doing the research on reliable and valid measures of these variables is a continuous effort that always, behavioral sciences
scholars have been involved in it (Homan, 1374). The method of present research is a correlation method in which it would be investigated the relationship between mathematics anxiety in students and the personality characteristics of their mathematics teachers.

**Statistical population and sampling method:**

Statistical population includes all high school students and their math teachers in school year 2008-2009. The sample size will be approximately 500 people from among high school girls and boys in the first, second, third and pre-university grades and their math teachers, that if there is the variance in the previous studies, it would be used the opposite equation:

\[ N = \frac{Z^2 \sigma^2}{d^2} \]

And if there is not the variance of the studied variable, the following equation will be used: \[ N = \frac{Z^2 pq}{d^2} \]

Sampling method is a classification method. In the sampling method, studied samples are categorized into classes which are more homogeneous with a view to variable type to become decreased their variation within the categories (Sarmad, Bazargan and Hejazi, 1376).

**Research Instruments:**

**Mathematics Anxiety Rating Scale (MARS)**

Mathematics Anxiety Scale called as MARS in the study has mathematics test anxiety (MTA) and mathematics nature anxiety (MNA) factors which encompass 18 questions.

Retest and internal congruence (Cronbach alpha) methods have been used to measure the reliability of the scale. The correlation coefficient between the scores of the subjects (high school students) has been obtained \( r = 892\% \) by test and re-test, that it is statistically significant at level \( p < 0.01 \). Also, the Cronbach alpha coefficient has been obtained \( a = %922 \) for total subjects (Shokrany, 1381). In order to assess the validity of MARS, the correlation coefficient of the test has been obtained with Cattell Anxiety Scale which is equal to \( r = 543\% \) (same). The questionnaire has been normalized by Shokrany and Hejazi (1381).

**NEO- Five Factor Inventory**

Initial version of the scale formed from the cluster analysis of Cattell sixteen factors inventory (Cattell, Eber and Tatsuoka, 1970) consists of three dimensions extraversion, neuroticism and openness (Costa and MacCrae, 1976). In 1983, Costa and MacCrae found that the dimensions were very similar to three of the five large personality factors. Another two factors added to their scale was pleasant and conscientious. In 1992, the final and revised form of NEO Five Factor Inventory which included 240 items was presented by Costa and MacCrae. The scale covers five large dimensions of the personality including: extraversion, neuroticism, openness, pleasance and conscientious. Each dimension includes 6 components.

Diagram A shows the validity and reliability coefficients (reliability) of the test into the separation of the five dimensions (John and Srivstava, 1999, quoted by Garoosi).

| extraversion | Pleasance | conscientious | neuroticism | openness | mean |
|--------------|-----------|--------------|-------------|----------|------|
| Reliability  | 78%       | 83%          | 83%         | 70%      | 79%  |
| The validity of correcting pairs | 83% | 79% | 96% | 90% | 85% | 92% |

* In order to estimate the validity, it has been calculated the correlation coefficient between the NEO-FFI test and the BFI test.
Results:

Inductive Analysis:

Table 1 - The correlation coefficient between the data for students' mathematics anxiety and the personality characteristics of their teachers

| Variables   | Boys' Mathematics Anxiety | Girls' Mathematics Anxiety |
|-------------|----------------------------|-----------------------------|
| Neuroticism | 0/105                      | 0/141                       |
| Extraversion| -0/141                     | -0/08                       |
| Flexibility | -0/112                     | -0/143                      |
| Pleasance   | 0/10                       | -0/146                      |
| Responsibility | -0/1396                | -0/168                      |

As we noted in the table, there is a significant relationship between the personality characteristics of male mathematics teachers and boys' anxiety in both extroversion and responsibility factors (p < 0.01). This means that the personality characteristics of high extroversion play a significant role in explaining the variance for boys' mathematics anxiety. Also, high responsibility has a part in explaining the variance for mathematics anxiety. It was observed no significant relationship in other three factors. While in the measurement of personality characteristics of female math teachers, there is a significant relationship between four personality factors of neuroticism (r= -0.141), flexibility (r= -0.143), Pleasance (r= -0.146) and responsibility (r= -0.168), and mathematics anxiety. It was only observed no significant relationship in extroversion factor.

Using chi-square test showed that there is a significant relationship between teachers' personality characteristics and students' mathematics anxiety.

5. Discussion and Conclusion:

It can mentioned the factors including involvement in activities that require mathematical knowledge, the educational system and teachers who consider the lesson as a useful, interesting and valuable science, the families who understand the individual differences of students in learning the mathematics and restrain themselves from creating the negative self-concept on mathematics lesson with attention to their unsuccessful experiences in the lesson, and finally, the cognitive development of teenager to explain decreased mathematics anxiety in the students in higher degrees. Also, the mathematical classroom level and assignment or test type has a determining effect on the gender differences in mathematical performance, for example, Kimba 1989, Fenema and Damon 1990, Seif 1376. The degree of parent's education as one of the most important indicators of economic and social class is another demographic variable that the results indicate its effect on academic achievement (Karpertyz and Hayden, 1989; Mehryar, 1972; Khayyer, 1365 and 1376 quoted by taghvaie, 1381). Fenema Motivation Model (1989) confirmed that a positive attitude towards mathematics plays a preventive role in increased mathematics anxiety. The attitude towards mathematics that mathematics is an important and useful lesson and it has a determining role in educational and occupational success cause the person's concern on its performance quality in the lesson to increase. It is necessary to mention that it has been observed the strongest correlation relationship between negative attitude towards mathematics and Pleasance variable, and it shows that negative feelings for mathematics is unwilling to engage with the assignments of the lesson, boredom and tiredness feeling for doing the assignments and lessons related to mathematics. The results of researches done by Nyrz, 2002; Nyrz, 1998; Markyshour (1997) showed that students who interested in mathematics and enjoyed involvement in activities required applying mathematical knowledge, would acquire more educational success in mathematics. Conversely, the students who experienced a range of negative emotions from restless and agitation to confusion, distress and fear of mathematics, would achieve less success in the lesson (Fenema, 1989; Kirk 2002). Nyrz (2002) suggested that decreasing the students' anxiety from routine formal educational experiences and dealing with negative feelings for the course is one way to improve the performance and reduce the mathematics anxiety. Here it is that the teachers' personality characteristics such as high flexibility, pleasance, conscientious, responsibility and emotional stability can be very useful and effective on theses lines. Several findings indicate that providing the opportunities for cooperative and competitive learning in schools can reduce the students' anxiety (Slavin, 1990). In addition, having variation in teaching methods and
evaluation methods of students (based on being strong the flexibility factor in character) are another way to reduce the mathematics anxiety in the educational environments (Woolfolk, 1993; quoted by audio, 2006). Change in the methods of teaching resulting in improved the attitude of learners towards mathematics (Macleod 1994), is a secure way to reduce the mathematics anxiety and to improve the performance of students' mathematics. As Tobias (1993) emphasizes that mathematics anxiety is resulted from that the students learn the mathematical facts and methods in separate and unrelated pieces of information which should be merely remembered. And when a section is forgotten, there is no strategy for its reconstruction and a confidence in entering into the more complicated processes.

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