RELATIONSHIP BETWEEN MATHEMATICS MOTIVATION AND MATH ANXIETY IN DEAF STUDENTS OF ARAK AND QOM IN 2013-2014 ACADEMIC YEARS

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ABSTRACT
The purpose of this study was to investigate the relationship between mathematics motivation and math anxiety in Deaf Students of Arak and Qom in 91-92 academic years. For this field, all deaf Students in guidance school and high school of Arak and Qom selected and filled the mathematics motivations and math anxiety scales. Pearson correlation and regression were used for analyzing the data. Results indicated that there is negative correlation between mathematics value and its dimensions (intrinsic goal orientation, extrinsic goal orientation and action value) with math anxiety; there is negative correlation between mathematics expectancy and self-efficacy with math anxiety; there is positive correlation between mathematics affect (mathematics test anxiety) and math anxiety. According to regression results, the strongest variable to predict the math anxiety is mathematics test anxiety in deaf Students (p<0.05). Paying attention to mathematics motivation plays an important role in academic motivation among deaf students.

Keywords: Mathematics Motivation, Math Anxiety, Deafness

INTRODUCTION
Approximately 450 million people have physical disabilities worldwide (Parvin et al., 2009) among whom more than 120 million people suffer from hearing loss. The disorder makes the cost about $ 150 million annually and is one of the goals of encouraging countries to World Health Organization (WHO) Prevention of deafness in international plans, including the reduction of its age of diagnosis and its implementation during birth (Parvin and et al., 2009). Despite a long history of educating deaf students, one of the problems of these students is the low achievement motivation and failure in their academic skills (Traxler, 2000). Most studies suggest that the academic achievement in deaf students in most courses is lower than normal students (Power and Leigh, 2000).

Mathematics is one of the most important subjects that students at all levels of education need to know and understand and deaf students are not excluded. The math problem is higher in them than normal students in most cases. Based on research on low math achievement is low in deaf students and this will affect math scores negatively (Traxler, 2000). They also face problem in the activities associated with the development of mathematic such as reasoning (Allen, 1995), logical thinking (Marschark and Everhart, 1999) and problem solving (Ansell and Pagliaro, 2006).

Research objectives
The overall objective of this study was to investigate the relationship between mathematics motivation and mathematics anxiety in deaf students.

B- Minor goals
Minor objectives of this research were:
1 – Determining the relationship between value of mathematics (goal intrinsic orientation, goal extrinsic orientation and action value) with math anxiety in deaf students.
2 - Determining the relationship between mathematical expectation (learning and self-efficacy beliefs control) with math anxiety in deaf students.
3 - Determining the mathematical relationship between math test anxiety and math anxiety in deaf students.
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4 - Determining the predictor variables of math anxiety among deaf students in the dimensions of mathematical motivation i.e. the value of the mathematics, expectation of Mathematics and mathematics test anxiety.

Research hypotheses

The research hypotheses are:

1 – There is a relationship between mathematical value (intrinsic goal orientation, extrinsic goal orientation and action values) as the mathematical motivation aspects with math anxiety in deaf students.

2 – There is a relationship between mathematical expectation (control of learning beliefs and self-efficacy) as the mathematical motivation aspects with math anxiety in deaf students.

3 – There is a relationship between math test anxieties as mathematical motivation aspects with math anxiety in deaf students.

Literature Review

Given that the objective of present study is to investigate the relationship between mathematics motivation with math anxiety in deaf students, here the theories and history of academic motivation entitled “Theoretical principles and research background” are discussed. The most common category of deafness is that, it divides the patients into two groups, "deaf" and "hearing impaired". This category is relatively simple except when experts present different definitions of it. There are usually two types of deafness (Halahan and Kaufman, 1997). Deafness is more tangible than unvocalness and the heaviness of loss of this important human feeling appears better in this way (Pakzad, 1997). It should be noted that there is a close relationship between hearing loss and mental retardation in language development. One of the most important factors in learning is the valuable components such as goal orientation, interest and importance to duty and other factors are such as expectations components, self-efficacy, beliefs, attributions and control beliefs (Pintrich, 1999).

(Kavousyan, 2011) indicated that students' ability to self-control depends on a set of cognitive - emotional skills that enable them to apply, orient and regularize their academic and personal functions in a realistic and flexible approach. If students know the material taught will satisfy his curiosity, or he will be given good grades and his motivation for learning will increase. Because the need for progress for students has a higher value, so the cultural factor must be increasingly applied in syllabus plan. However teachers become familiar with training techniques and psychology, they can teach the need for progress easier and better, in fact the achievement motivation is the first step in performing cultural lessons and it is the ultimate goal of education in schools (Kavousyan, 2011). Students who do not have enough confidence or see themselves unable may avoid things that are challenging or difficult, while those students who feel they have a greater ability tend to deal with difficult and challenging issues more (Bandura, 1993). This means that the person value is associated with his ability to do things. The aim is that the students' behavior is a function of their desire to achieve certain goals, and research primarily emphasize on two main objectives of learning (also called mastery or task) and performance (which is also called Ego-Oriented, Figure 3). Students who pursue mastery goals are usually autonomous and independent (Seifert, 1997) and their tendencies lead to cognitive growth. They believe that effort (or more importantly, some internal and controllable factors) are the cause of success or failure and the flexible intelligence Venkatesh Kumar and Karimi (2010) in a study with the aim of examining mathematics anxiety, mathematics performance and academic performance of mathematics, mathematics performance and academic performance in high school students which was conducted on 424 students, showed that math anxiety has a relationship with math performance and academic performance of students.

Based on research background, it can be concluded that a coherent research has not been performed regarding the relationship between motivations in mathematics with math anxiety in deaf students. But based on the related research it can be concluded that there is a relationship between mathematical motivations with math anxiety in deaf students. Therefore, in this study it will be tried to address this issue integrated.
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MATERIALS AND METHODS

The research method is correlation. Because the main goal of this study is to investigate the relationship between mathematics anxiety and mathematics motivations with deaf students. According to the aim, the mathematics motivation is considered as predictor variable and math anxiety as the criterion variables.

Statistical population

The statistical population of this study are the entire deaf students in secondary and high schools of Arak city (30) and Qom (43) (N = 73).

Statistical Sample

In the study sample size of students is equal to the population size. In other words, the entire deaf students in secondary and high school of cities of Qom and Arak have been participated in the study (n = 73). After collecting the questionnaires, 10 questionnaires were removed because it was unfinished and the final sample was reduced to 63 (n = 63).

Data collection tools

In this study, field method will be used to collect data due to the use of questionnaires. Accordingly, data collection tools in this study include:

A - Demographic characteristics questionnaire: This questionnaire includes variables such as age, gender, and more.

Math Motivation Scale

This questionnaire was made by Feng and Huang (2010) and has 29 items and the way of responding the items is graded from 5 -point Likert scale from very disagree (1) to very agree (5). Score on this scale is from 36 to 180. This questionnaire has three subscales: 1 - mathematical value (intrinsic goal orientation (4 items), extrinsic goal orientation (5 items) and the activity value (5 items)). 2 - Expectation (control of learning beliefs (4 items), self-efficacy (5 items)) and 3 - emotion (test anxiety (6 items)). In the study of Feng and Huang (2010), Cronbach's alpha coefficients for the subscales mathematical expectation and emotion were obtained 88/0, 87/0, and 76/0, respectively. Also in the study of Feng and Huang (2010) the validity of this questionnaire has been approved.

B - Mathematics Anxiety Scale: This scale is made by Bai et al., (2009) with 14 items and is useful for use in schools. Cronbach's alpha coefficient for this scale is equal to 91/0. Reliability coefficient of this scale on the negative items was 67/0 to 89/0 and the coefficient for positive items range from 67/0 to 87/0, respectively (Bai et al., 2009). Sanaei research (2012) the Cronbach's alpha coefficient of the questionnaire was equal to 79/0 and there is a significant relationship between this scale and mathematics attitude scale.

Statistical test for data analysis

In this study, Pearson correlation coefficient will be used to study the research hypotheses and multiple variable regressions with entry method will be used to study the research questions.

RESULTS

The present study aimed to investigate the relationship between students' mathematics motivation with math anxiety –in the fifth grade students. After collecting the questionnaires, raw data were analyzed using SPSS-20 and percentage, frequency, mean and standard deviation, Pearson correlation and multiple variable regression coefficients were analyzed with log method using statistical tests. Therefore, the research findings are given in three parts of descriptive findings, findings related to the hypotheses and findings related to the questions.

Descriptive findings

As can be seen in Table 1, the maximum amount of participants was for age 19 (5/17 %) and 17 (3/14 %) and the lowest was for the age 13 (6/1 %) and 14 (6 / 1%).

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As it can be seen in Table 2, 3/60 % of participants have been selected from Velayat School and 37/29 % of Imam Ali (AS) School.

As it can be seen in Table 3, 8/50 % of participants were selected from secondary school and 2/49 % of high school.

As it can be seen in Table 4, 3/60 % of participants have been selected from the city of Qom, and 37/29 % of the city of Arak.

As it can be seen in Table 5, according to the type of hearing loss, 4/52 % of participants were deaf and 6/47 % was partially hearing.

As it can be seen in Table 6, the mean and standard deviation of math anxiety, math motivation and its dimensions in the deaf students.
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Table 6: Mean and standard deviation of research variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math anxiety</td>
<td>36.20</td>
<td>7.36</td>
</tr>
<tr>
<td>Math Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic goal orientation</td>
<td>13.39</td>
<td>3.465</td>
</tr>
<tr>
<td>Extrinsic goal orientation</td>
<td>17.79</td>
<td>2.80</td>
</tr>
<tr>
<td>Activity value</td>
<td>17.22</td>
<td></td>
</tr>
<tr>
<td>Expectation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control beliefs for learning</td>
<td>14.14</td>
<td>3.86</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>15.81</td>
<td>3.72</td>
</tr>
<tr>
<td>Emotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math test anxiety</td>
<td>17.92</td>
<td>7.36</td>
</tr>
</tbody>
</table>

Findings related to Hypotheses

Table 7 is related to the first hypothesis that is there is a relationship between mathematical value (intrinsic goal orientation, extrinsic goal orientation and action values) as the mathematical motivation aspects of deaf students with math anxiety.

Table 7: Results of Pearson correlation to examine the relationship between mathematics values and its dimensions with math anxiety in deaf students

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Criterion variable (math anxiety)</th>
<th>Correlation</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic goal orientation</td>
<td></td>
<td>-0.468</td>
<td>0.0001</td>
</tr>
<tr>
<td>Extrinsic goal orientation</td>
<td></td>
<td>-0.269</td>
<td>0.035</td>
</tr>
<tr>
<td>Activity value</td>
<td></td>
<td>-0.387</td>
<td>0.002</td>
</tr>
<tr>
<td>Math value (total)</td>
<td></td>
<td>-0.421</td>
<td>0.001</td>
</tr>
</tbody>
</table>

As Table 7 shows there is a negative significant relationship between value of math and its dimensions i.e. the intrinsic orientation of the target and extrinsic goal orientation and activity value with math anxiety in deaf students. Based on this, hypothesis one has been approved i.e. there is a relationship between mathematical values(as intrinsic goal orientation, extrinsic goal orientation and action values) as one of the aspects of mathematical motivation with math anxiety in deaf students.

Table 8 is related to the second hypothesis that is "there is a relationship between the mathematical expectation (control of learning beliefs and self-efficacy) as one of the motivating aspects of math with math anxiety in deaf students.

Table 8: Results of Pearson correlation to examine the relationship between mathematical expectation and its aspects with math anxiety in deaf students

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Criterion variable (math anxiety)</th>
<th>Correlation</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of learning beliefs</td>
<td></td>
<td>-0.245</td>
<td>0.055</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td></td>
<td>-0.342</td>
<td>0.007</td>
</tr>
<tr>
<td>Math expectation (total)</td>
<td></td>
<td>-0.376</td>
<td>0.003</td>
</tr>
</tbody>
</table>

As shown in Table 8, there is a negative significant relationship between mathematical expectation and mathematics self-efficacy with math anxiety in deaf students. Accordingly, hypothesis 2 has been approved that is there is a relationship between mathematical expectation and self-efficacy as the mathematical motivation with math anxiety in deaf students.

But no significant correlations were found between control beliefs of learning and math anxiety.

Table 9 is related to the third hypothesis, that is there is a relationship between math emotion (learning beliefs and self-efficacy) as one of the motivating aspects of math with math anxiety in deaf students.
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Table 9: Results of Pearson correlation to examine the relationship between mathematical affect (math test anxiety) with math anxiety in deaf students

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Correlation</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotion (math test anxiety)</td>
<td>0.343</td>
<td>0.006</td>
</tr>
</tbody>
</table>

As shown in Table 9, there is a positive significant relationship between emotion of mathematics (math test anxiety) and math anxiety ($r = -343/0$) in the deaf students. Accordingly, Hypothesis 3, namely "there is a relationship between math emotion (math test anxiety) as a mathematical motivation with math anxiety in deaf students," has been approved.

Findings related to questions

Table 10 relates to the research question, is aspects of math motivation (the mathematical expectation of math and math test anxiety) predict the math anxiety of deaf students?

Table 10: Results of multiple variable regressions by log method for predicting deaf students' mathematics anxiety through motivational aspects of mathematics

<table>
<thead>
<tr>
<th>ANOVA Model</th>
<th>Sum of squares</th>
<th>Df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1204.694</td>
<td>3</td>
<td>401.565</td>
<td>11.051</td>
<td>0.001</td>
</tr>
<tr>
<td>The remaining</td>
<td>2107.580</td>
<td>58</td>
<td>36.338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3312.274</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor variables</th>
<th>Non-standardize coefficient</th>
<th>Standard coefficient</th>
<th>Beta</th>
<th>T</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>39.900</td>
<td>5.379</td>
<td>-</td>
<td>7.418</td>
<td>0.001</td>
</tr>
<tr>
<td>Math value</td>
<td>-0.313</td>
<td>0.113</td>
<td>-0.430</td>
<td>-2.275</td>
<td>0.008</td>
</tr>
<tr>
<td>Math expectation</td>
<td>-0.123</td>
<td>0.200</td>
<td>-0.095</td>
<td>-0.616</td>
<td>0.54</td>
</tr>
<tr>
<td>Math test anxiety</td>
<td>0.850</td>
<td>0.212</td>
<td>0.429</td>
<td>4.013</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Note: ($R= R0.6.3^2 = ADJ .R0.364^2 = 0.331$

As shown in Table 10, according to the amount of $2R$ in mathematical motivation dimensions (values, expectations and math test anxiety) approximately 36/0 variance explained the math anxiety scores for deaf students. So according to the amount of beta, math value was negative ($430/0 = Beta$) and math test anxiety was positive ($429/0 = Beta$) were the strongest variable to predict math anxiety scores of deaf students ($p > 0.01$). So the answer to this question is positive.

Conclusions

In explaining these findings, it can be said that test anxiety is related to negative emotions associated with an exam, so that deaf students who have negative emotions towards math exams and consequently have anxiety toward mathematics and related activities suffer from anxiety.

Institutions and training centers associated with the Deaf are recommended that pay special attention to the deaf students' math anxiety and highlight the role of related variables such as math motivation. Institutions and training centers associated with the Deaf are proposed to teach and train teachers and deaf students, ways of increasing math motivation and making deaf students interested in math and activities related to it in order to modulate their anxiety rate and so to better help academic health of deaf students.

REFERENCES


