ORIGINAL ARTICLE Received 18 March. 2015 Accepted 12 August. 2015

Vol. 5, Issue 1, 109-115, 2016

Academic Journal of Psychological Studies

ISSN: 2333-0821

ajps.worldofresearches.com

Studying the Motivational Beliefs as Predictor Variables in Math Academic Performance

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A B S T R A C T

The aim of this study was to investigate the Motivational Beliefs as Predictor Variables in Math Academic Performance. The statistical population of the study consisted of all junior high school students in Bandar Abbas in the first educational district in the academic years 2015-16. The sample consisted of 418 students, including 191 girls and 227 boys who were selected using multistage cluster sampling method. The required information to explain the three components of motivational beliefs, such as self-efficacy, intrinsic valuing and test anxiety were collected through a series of 25 questions of the Motivational Strategies for Learning questionnaire (MSLQ) (Pintrich and DeGroot, 1990). Results show that the average of continuous score for female students in math is 15.37 and for male students is 13.14. Standard deviation for continuous grades among girls is 3.5 and for boys is 4.19. Since the obtained p-value for all the research variables is a number greater than 0.05, there is no reason to reject the null hypothesis (H_0) and the assumption of normality is confirmed for all variables. Also, results show that there is no difference between the aggression reduction pre-test in the test and control groups. But there is a significant difference in the aggression reduction post-test in the test and control groups with the control of aggression reduction pre-test with F value of 2426.21 at p <0.001. Also, the effect size difference between the two groups is 0.97 and that the amount of the difference is extremely high and demonstrates the effectiveness of the experiment.

Keywords: *Motivational Beliefs, Self-efficacy, Intrinsic valuing, Test anxiety, Math Academic Performance*.

INTRODUCTION

Understanding the factors affecting learning and academic performance of students has always been as one of the key issues in the field of psychology and education so that the researchers in this field have studied the testimonies related to academic performance and achievement for several years[1]. In this regard, attention and focus on motivational and cognitive factors as the main elements of learning and components related to them and evaluating the mutual effect of these components on each other have been considered as a principle strategy. The

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To cite this article: Hasanzadeh, Sh. (2016). Studying the Motivational Beliefs as Predictor Variables in Math Academic Performance. *Academic Journal of Psychological Studies,* 5 (1), 109-115.

set of these cognitive and motivational factors provides the stage for the study of variables such as intelligence, creativity, personality, attitude, methods of study and learning, study and learning strategies, learning styles, emotional intelligence and motivational beliefs. These constituents can be divided in two categories of cognitive and emotional components [2].

Cognition includes the recipient of some of the abilities and mental acts such as knowledge, understanding, diagnosis, thinking, judgment and reasoning. However, emotion deals with factors such as motivation, excitement, attitude, valuing and so on [3].

What is at the current center of attention by psychologists and educational experts regarding the academic performance of students is relating motivational cognitive processes and estimating the share of each one of the cognitive and motivational (emotional) factors in predicting academic performance [1, 4].

In a comprehensive study, Pintrich and DeGroot[2] have studied the relationship between various components of motivational and cognitive beliefs with academic performance of students. They have used a motivational model called "expect - value" to select motivational variables in order to carry out this study. In this model, three motivational components of 'expectations, values and affection "are intended in the field of education and academic performance of students. They have considered self-efficacy, intrinsic valuing and test anxiety as an index to the motivational components of expectations, values and emotion respectively and under the general title of motivational beliefs.

In fact, motivational beliefs refer to individual beliefs that guide and reflect the academic activities of students. In other words, we can say that motivational beliefs are the individual and personal reasons of students to perform or avoid a task or academic activity[2].

Component of expectation will include students' beliefs about their abilities to perform a task or a test. Component of value includes the goals and beliefs of students regarding a task being important and/or interesting and the component of emotion includes interesting emotional reactions of students regarding a task or educational subject[5].

Accordingly, Pintrich and DeGroot presented a model of motivational beliefs that includes the expectations, values and emotions components. In this model, the self-efficacy, intrinsic valuing and test anxiety as motivational beliefs denote expectations, values and emotions respectively[2].

A: Self-efficacy: according to the view of Pintrich and DeGroot, self-efficacy for learning is a personal understanding and evaluation of strategies during which people are motivated and follow their academic goals. In fact, self-efficiency creates a sense of ability to achieve academic achievement. In other words, it can be said that self-efficacy is been defined as a personal judgment in which the person uses his abilities to design and follow an educational purpose[6].

B: The intrinsic valuing of an assignment: the intrinsic valuing of an assignment refers to an extent of importance that a student assigns to doing an assignment or learning a subject or a lesson. In other words, internal valuing is the extent of being important and interesting of a subject for a student[3].

C: Test Anxiety: Test anxiety refers to the fear that people show when taking a test performing a task. In accordance with the views of Dosk (1980), test anxiety is an unpleasant state of behavioral and psychological consequences arise while exam success or when performing a task. Motivational beliefs are a part of self-regulation theory formed based on social learning theory of Albert Bandura[4].

In accordance with the view of Zimmerman (1998), self-regulation is a process through which students convert their mental abilities into academic skills. In Bandura's point of view, self-efficacy as a component of motivational beliefs plays a fundamental role in this communication.

Research results of Pintrich and DeGroot have shown that self-efficacy and test anxiety are the best predictors of academic performance of students. The results also showed that self-efficacy was significantly higher in boys and test anxiety was significantly higher in girls[2].

The present study follows this aim to investigate the predicting power of each of the triple components of motivational beliefs (self-efficacy, internal valuing and test anxiety) in relation to Math performance of junior high school students of Bandar Abbas. In better words, this research seeks to answer this question that to what extent motivational beliefs components predict the mathematical performance? And whether the motivational beliefs can predict students' performance in math? Moreover, whether there is a difference between girls and boys in terms of the relationship between motivational beliefs and math performance?

Most researches have been done to examine the relationship between motivational beliefs and academic performance of students. In this regard, the comprehensive research results of Pintrich and DeGroot showed that self-efficacy leads to generate more motivation among students. They also showed that there is no significant difference between boys and girls on the extent of motivational beliefs[2]. Due to the importance of academic performance of students and the impact of the student himself in this regard, this study investigates the effect of motivational beliefs in the prediction of Math performance among students.

METHODOLOGY

The present study is correlation-based in which the extent of motivational beliefs components (self-efficacy, internal valuing and test anxiety) among students has been studied as well as the relationship of these components together and with academic performance of students in Math.

The statistical population of the study consisted of all junior high school students in Bandar Abbas in the first educational district in the academic years 2015-16. The sample consisted of 418 students, including 191 girls and 227 boys who were selected using multistage cluster sampling method. The method of

selecting the sample was that the schools in Bandar Abbas in district 1 and 2 were selected. Then, two junior high schools were selected from district 1 and two junior high schools were selected from district 2; each including one girls' school and one boys' school randomly. In the next phase, three classes for each school were selected randomly and its students were selected as sample. Four schools were selected in total, 12 classes including 6 girls' classes and 6 boys' classes were selected as sample and ultimately 418 students.

The required information to explain the three components of motivational beliefs, such as self-efficacy, intrinsic valuing and test anxiety were collected through a series of 25 questions of the Motivational Strategies for Learning questionnaire (MSLQ)[2]. Continuous and final scores of students were used to determine the academic performance of students in Math.

MSLQ questionnaire has 47 articles, 25 articles of which are for the motivational beliefs and 22 articles are for self-regulated learning strategies. The scale of motivational beliefs consists of three subscales of self-efficacy (9 items), intrinsic valuing (9 items) and test anxiety (7 items). Self-regulated learning Strategies scale has two subscales of using cognitive strategies (13 items) and self-regulation (9 items). MSLQ questionnaire is close-test based which is been graded on the Likert scale ranging from strongly agree to strongly disagree. In this questionnaire, completely agree scores 5 and strongly disagree scores 1.

In the present study, Cronbach's alpha reliability evaluated the reliability of the questionnaire and the results showed that the calculated alpha coefficient for self-efficacy (a=0.73), intrinsic valuing (a=0.73) and test anxiety (a=0.74) and for the sum of components of the motivational beliefs (a= 0.67) is been estimated that shows a relatively acceptable coefficient.

After selecting the research sample using multistage cluster sampling method in accordance with the Education Department authorities and school principals and executives, the necessary explanations were presented in the class in the presence of executives. These descriptions included expressing the purpose of questioning, how to complete it and focus on the essentials when completing the questionnaire. After completing the questionnaires by students with the help of one of the executives of school who are aware of the students' characteristics, their characteristics are written on the questionnaire in order to add the continuous and final score of students in Math. The information by the implementation of the research questionnaire (MSLQ) and Math scores of students were analyzed using inferential and descriptive statistic methods as follows:

1. Frequency, frequency percentage, mean, median, mode, and standard deviation
2. Pearson correlation coefficient
3. Multiple regressions

RESULTS

Evaluating the academic performance of students in Math shows that the average of continuous score for female students in math is 15.37 and for male students is 13.14. Standard deviation for continuous grades among girls is 3.5 and for boys is 4.19.

Table 1. The state of continuous Math scores of the study sample

Row	Gender	Number	Mean	Standard deviation	Mean standard error
1	Female	191	15.37	3.51	0.25
2	Male	227	13.14	4.19	0.27

Evaluating the academic performance of Math (final score) indicates that the average of final scores of Math for girls is 12.93 and for boys is 12.23. Standard deviation (SD) of girls' scores is been estimated as 4.88 and for boys as 4.52.

Table 2. The state of final Math scores of the study sample

Row	Gender	Number	Mean	Standard deviation	Mean standard error
1	Female	191	12.93	4.88	0.35
2	Male	227	12.23	4.52	0.3

In order to allow a better comparison, students' continuous scores in math are changed into the standardized score. To this end, Z score is multiplied by 10 and was added by 50. Results showed that the mean in girls is 53.43 and mean in males is estimated 47.14.

Table 3. Math performance based on standardized scores

Row	Gender	Number	Mean	Standard deviation	Mean standard error
1	Female	191	53.43	8.57	0.62
2	Male	227	47.14	10.23	0.67

Evaluating the motivational beliefs in male and female students indicates that the performance of boys was better compared with girls in self-efficacy scale, so that the mean of girls was 3.44 and the mean of boys was 35.59. The performance on the scale of intrinsic valuing shows the better performance of boys than girls, so that the mean of girls was 36.8 and the mean of boys was 37.82. In the test anxiety scale, girls have experienced more anxiety compared with boys, so that the mean of anxiety level of girls is 22.4 and for boys is 20.83.

Table 4. The motivational beliefs in the sample

Scale	Gender	Mean	Standard deviation	Mean standard error
Self-efficacy	Female	33.44	5.58	0.4
	Male	36.59	4.45	0.29
Intrinsic valuing	Female	36.82	5.52	0.39
	Male	37.82	4.9	0.32
Test anxiety	Female	22.4	7.75	0.56
	Male	20.83	7.21	0.47

To determine the contribution of each predictor variables (motivational beliefs, self-efficacy, intrinsic valuing and test anxiety) on academic performance of Math (final scores), the standardized Beta was calculated for assessing the contribution of each of the variables in the model size. According to this model, large numbers indicate that changes in the predictor variables have great impact on the criterion variable.

Table 5. Calculating standardized Beta on an assessment of the contribution of each predictor variables on criterion variables (the final score)

Variable	B	Standard error	Beta	T	Level of significance
-	10.85	1.97	-	4.59	0.000
Self-efficacy	-0.128	0.091	-0.139	-1.398	0.163
Test anxiety	-0.401	0.056	-0.639	-7.216	0.000
Intrinsic valuing	-0.158	0.05	0.326	3.151	0.002

According to table5, the most extent of predictor is related to the variable of test anxiety and motivational beliefs and due to the evaluated t, this scale is significant in the confidence level of more than 95 percent for the motivational beliefs and more than 99 percent for the test anxiety.

CONCLUSION

Evaluating the analysis of first hypothesis data meaning the predictor of Math performance through motivational beliefs shows that the maximum correlation is between the three components of motivational beliefs meaning self-efficacy, intrinsic valuing and test anxiety is related to test anxiety so that the correlation between test anxiety with the final scores of Math is -0.44 and is -0.4 with the continuous scores and standardized continuous scores. In all the three cases, there is a significant correlation in the confidence level of more than 99 percent ($p<0.00$). The correlation between the intrinsic valuing and with final scores is 0.3 and is 0.28 with the continuous scores and standardized continuous scores. In all the three cases, there is a significant correlation in the confidence level of more than 99 percent ($p<0.000$). The correlation between the self-efficacy and with final scores is 0.27 and is 0.22 with the continuous scores and standardized continuous scores. In all the three cases, there is a significant correlation in the confidence level of more than 99 percent ($p<0.000$).

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