

Evaluating the Effect of Emotional Creativity on the Achievement of Mathematics Course among the Third Grade Elementary School Girl Students in District 4 of Tabriz in Academic Year of 2015-2016

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ABSTRACT

The aim of present study is to evaluate the effect of emotional creativity on the achievement of mathematics course among the students in the third grade elementary school girl students in the District 4 of Tabriz in the academic year of 2015-2016. The method of the present research was descriptive-survey in terms of nature and applied in terms of aim and field in terms of data collection. The statistical population included all 2390 girl students in the third grade of elementary school in the District 4 of Tabriz in the academic year of 2015-2016. A total of 331 of them were selected by random sampling method based on the Cochran's formula. Data were collected using a standardized Emotional Creativity Questionnaire and Shalev test. Content validity was used to assess the validity of the questionnaires and Cronbach's alpha was used to assess the reliability of the questionnaires. Ghadiri Nejadian (2002) measured the validity of the Emotional Creativity Questionnaire with a mean Cronbach's alpha of 0.52. Brahmand et al. (2006) and Khatami (2015) also obtained the reliability of the Shalev test at 0.95, which indicates acceptable reliability. To analyze the data, descriptive and inferential statistics, Pearson and regression tests were used, which were calculated and confirmed in SPSS software. The results showed that there is a significant positive relationship between emotional creativity and its components (preparedness, innovation, honesty, and effectiveness) and the achievement of students in mathematics course and academic achievement can be predicted through 45% of innovation, 40% of preparedness, 44% of honesty, 47% of effectiveness, and 58% of emotional creativity. Thus, emotional creativity and its components have an effect on the academic achievement of the studied students.

Keywords: Emotional Creativity, Mathematics Achievement, Third Grade Elementary School Students.

Introduction

The goal of educating students is their academic achievement. Academic achievement means the extent to which learners have been successful in achieving the goals of the teaching the course (Seif, 2009). Academic achievement, in addition to indicating the achievement of predetermined educational goals, has

many positive outcomes such as self-esteem, self-confidence, high preparedness for further learning, etc. for students (Salmani Moghaddam, 2001). Increasing motivation and academic achievement is related to various components, especially in some basic courses such as mathematics, having motivation and willingness to learn and achievement is crucial, since, students will face many problems in the case of lack of interest in mathematics. Also, one of the most important issues for officials dealing with the mathematics education is the opportunities and threats caused by the development of information and communication technology and principled planning for its use. It is especially necessary for students to be involved creatively in learning at different times (Gholam Azad et al., 2012).

Some experts in the area of mathematics education believe that living in today's complex and advanced world requires creative thinking and dynamic and productive thinking, and effective learning of mathematical knowledge can help to form and develop this thinking (Schoenfeld, 1989). It has often been observed that students who are very similar in terms of ability and talent for learning and creativity are very different in academic achievement. This difference can be seen not only in school courses but also in other non-academic activities. One of the factors that have a positive effect on students' academic achievement is emotional creativity. Emotional creativity in a new approach proposed in line with emotional intelligence, has been considered as an effective factor in academic achievement. Emotional creativity is thought to be related to the richness of a person's emotional life (Ircevic; Brackett & Mayer, 2007).

The idea of emotional creativity was proposed by Averill (2002). Emotional creativity is a construct in the field of emotions and affections proposed by Averill et al. (Averill and Knowles, 1991; Averill and Nunley, 1992). From these researchers' point of view, emotional creativity is the expression of self (authenticity) in a new way (innovation) through which a person's intellectual lines are expanded and his or her interpersonal relationships increase (effectiveness) (Jowkar and Alborzi, 2010). Mirkamali (2002) argues that the creative person has two characteristics: one is analytical thinking and the other is creative thinking that is a kind of mental skill through which the power of imagination and thought creates the new ideas to achieve one or more solutions. Foolad Chang (2005) conducted a research entitled "Investigating the effect of metacognitive education on academic achievement in mathematics". The results of this study indicated the need to make corrections and reforms in terms of teaching metacognitive skills in school curricula and mathematics education. Hashiri (2004) conducted a study entitled "Investigating of the relationship between emotional creativity and students' academic achievement". The results of the analysis showed that there is a significant correlation between emotional creativity and academic achievement.

Kadivar et al. (2010) conducted a research entitled "Investigating of the relationship between learning styles and self-efficacy beliefs and mathematics achievement". The results showed that there is a significant positive correlation between students' achievement in mathematics and self-efficacy beliefs. Zhang (2001) examined the relationship between thinking styles and academic achievement and showed that conservative thinking style positively and free thinking styles negatively predict students' academic performance. Oginni & Popoola (2013) showed that innovation, status, gender and technology have a significant positive effect on students' academic achievement.

Training efficient and effective human resources is one of the main tasks of education, and since students are valuable assets of any country in terms of talent, innovation and constructive resources, it is crucial to pay attention to their training. Students' academic achievement is not only an individual issue but also a fundamental social issue that its unfavorable consequences will also affect the society. Since one of the main goals of the education system is to improve learning and academic achievement of students, in the path of educating the students, the share of school and educational factors and to promote the creativity of the students is also important. Emotional creativity is a new construct that is being explored. Therefore, there are several questions in this regard that highlights the need for conducting various studies. Accordingly, in the present study, the effect of four components of innovation, preparedness, honesty and effectiveness of emotional creativity components on the achievement of mathematics lessons of third grade

elementary students of girl schools in the District 4 of Tabriz in the academic year of 2015-2016 is evaluated.

Methods

The present study is a descriptive research in terms of controlling research conditions. It is also an applied research in terms of aim. The statistical population of the present study included all 2390 girl students in the third grade of elementary schools in the District 4 of Tabriz in the academic year of 2015-2016. The number of samples based on Cochran's sampling formula with estimation accuracy of $d = 0.05$, maximum variance of $pq = 0.25$ and 95% confidence level was determined at 331 people based on the random sampling.

Table 1: Statistical population and sample of third grade elementary school students in District 4 of Tabriz

School type	Statistical population	Statistical sample
mixed	202	28
Non-profit	570	79
public	1618	224
sum	2390	331

Two questionnaires were excluded due to being defective and finally the research was continued with 329 people. The tools used in this study are two standard questionnaires for assessing the variables as follows:

Emotional Creativity Questionnaire

This questionnaire is a paper pencil scale that is based on self-report. The tool was designed and implemented as part of Thomas's master thesis in 1989 and was revised by Averill et al. from 1991 to 1999. In the fourth review, changes and factor analysis were performed on this questionnaire and the final version was implemented by them in 1999 (Averill, 1999). This tool measures four dimensions of emotional creativity: "preparedness", "innovation", "effectiveness" and "honesty". The tool has 30 key items including 7 items for preparedness, 14 items for innovation, 5 items for effectiveness and 4 items for honesty. Ghadiri Nejadani (2002) measured the validity of this construct by implementing this tool on students of Tehran public universities. He obtained "construct validity" of emotional creativity by calculating the Pearson coefficient between test items and the factors of each item, which the proportional correlation between the data was about 0.5 on average. To examine the test validity coefficient, Gatbezal and Averill (1996), in two studies on psychology students using the emotional creativity inventory, found that this tool has a high internal consistency.

Student's mathematics performance Shalev test

This test was developed by Shalev et al. (1993; quoted by Brahmand et al., 2006) based on the model of numerical processing of McCloskey, Karamaza and Basili (1985). It consists of three parts. The first part is numerical understanding, which has 8 subtests are for counting, understanding more or less, matching, reading numbers, writing numbers alphabetically and numerically, comparing numbers, using mathematical symbols, and arranging numbers. The second part is about numerical production and has subtests for summing up, subtracting, multiplying and sample and one-digit dividing. The third part is about numerical calculation and includes subtests for multi-digit calculations for summing up, subtracting, multiplying and dividing.

The total score of this test is 100 and it is a reference group test. The reliability of this test on a sample of 703 people was obtained at 0.92 (Shalev, Manor, and Gross Tsour, 2005; quoted by Brahmand et al., 2006). In a study conducted by Brahmand et al. (2006) = on a study on elementary school students in

Ardabil and Khatami (2015) in Iran, its reliability coefficient using Cronbach's alpha coefficient was obtained at 0.95. The validity of the Emotional Creativity Questionnaire and Shalev test was confirmed using content validity and the opinion of the supervisor. To test the reliability of the questionnaire items, it was randomly distributed among 30 students, then the collected information was tested and the reliability was confirmed by calculating Cronbach's alpha according to Table (2).

Table 2: Reliability of the questions related to the studied variables

Variable	Items	Alpha
Innovation	8	0.72
Preparedness	6	0.67
Honesty	9	0.84
Effectiveness	7	0.64
Emotional creativity	30	0.91

Data were analyzed using SPSS-21 software so that the central and dispersion indices were calculated for description. Finally, Pearson correlation coefficient and linear regression analysis were used to test the variables to investigate the relationship and to explain and their effects.

Results

The results showed that out of 329 students, 27 (8.2%) were in mixed schools, 78 (23.7%) were in non-profit schools and 224 (68.1%) were in public schools. The mean status of emotional creativity of students was 102.42 with standard deviation of 20.99 and skewness coefficient of -0.47, so that the lowest score was obtained at 38 and the highest was 142. Also, the mean score of students' achievement in mathematics course was 15.43. According to Pearson correlation coefficient test and according to table (3), the significance level of the test is $p = 0.000$ and below 0.05 and $r = 0.67$. Thus, there is a significant direct and strong relationship between the two variables and the coefficient of determination or R^2 is 0.45. It means that the students' innovation predicts the achievement of their mathematics course by 45%.

Table 3: Correlation between innovation and students' achievement in mathematics

Variables	Students' innovation
achievement in mathematics	$r = 0.67$ $p = 0.000$ $n = 329$ $R^2 = 0.45$

Also, based on the information in Table (4), the significance level of the test is $p = 0.000$ and below 0.05 and $r = 0.63$. Therefore, there is a significant direct and strong relationship between the two variables and the coefficient of determination or R^2 is 0.40. It means that students' preparedness predicts the achievement of their mathematics course by 40%.

Table 4: Correlation between preparedness and students' achievement in mathematics course

Variables	Students' preparedness
achievement in mathematics	$r = 0.63$ $p = 0.000$ $n = 329$

Based on Table (5), the significance level of the test is $p = 0.000$ and below 0.05 and $r = 0.66$. Therefore, there is a significant direct and strong relationship between the two variables and the coefficient of determination or R^2 is 0.44. It means that students' honesty predicts the achievement of their mathematics course by 44%.

Table 5: Correlation between honesty and students' achievement in mathematics

Variables	Students' honesty
achievement in mathematics	r = 0.66 p = 0.000 n = 329 R ² = 0.47

Based on the Pearson correlation coefficient test and based on the information in Table (46), the significance level of the test is $p = 0.000$ and below 0.05 and $r = 0.68$. Therefore, there is a significant direct and strong relationship between the two variables and the coefficient of determination $R^2 = 0.47$. It means that students' effectiveness predicts the achievement of their mathematics course by 47%.

Table 6: Correlation between effectiveness and students' achievement in mathematics

Variables	effectiveness
achievement in mathematics	r = 0.68 p = 0.000 n = 329 R ² = 0.47

Based on the general results in Table (7), the significance level of the test is $p = 0.000$ and below 0.05 and $r = 0.76$, so there is a direct and strong relationship between the two variables and according to the coefficient of determination or $R^2 = 0.58$, emotional creativity of students predicts the achievement of their mathematics course by 58%.

Table 7: Correlation between emotional creativity and students' achievement in mathematics achievement

Variables	emotional creativity
achievement in mathematics	r = .076 p = 0.000 n = 329 R ² = 0.58

Discussion and Conclusion

Considering the effect of innovation on the achievement of mathematics course for third grade elementary school girl students, the results showed that the significance level of the test was $p = 0.000$ and below 0.05 and $r = 0.67$. Therefore, there is a significant direct and strong relationship between the two variables and students' innovation predicts their academic achievement by 45%. In explaining these results, it can be stated that the future of any society undoubtedly depends on the innovation and creativity of its people, and at the knowledge-based age, a country can have a good economic, cultural and social status if it invests in teaching innovation to its students, since according to the results of various studies and contrary to the misconceptions that consider innovation and creativity are inherent abilities, creativity and innovation can be acquired.

Thus, one of the basic tasks of the educational system is to teach innovation to students, which in turn will lead to achievement in mathematics. Sternberg (2002) developed the cognitive-emotional model of the mathematical problem based on three components of cognitive strategies, metacognitive processes and emotional factors. As most researchers have agreed, creativity is the ability to produce new (authentic and unique), useful and productive work. The results of a study conducted by Oginni and Poppla (2013) showed that innovation, status, gender and technology have a significant positive effect on students' academic achievement.

Trivedi and Bhargava (2010) found that students with high levels of academic achievement are very similar to students with high levels of innovation. It was also found that the gender of students has a significant effect on their level of innovation. Fuchs et al. (2010) concluded that emotional creativity and the dimensions of preparedness, effectiveness / authenticity are negatively associated with alexithymia and its dimensions (inability in describing, recognizing, and external orientation of emotion). The relationship between emotional novelty and difficulty in describing emotions was positive and the relationship between emotional novelty and external orientation was negative and significant.

Considering the effect of preparedness on the achievement of mathematics course in third grade elementary school girl students, the results showed that the significance level of the test was $p = 0.000$ and below 0.05 and $r = 0.63$. In explaining this result, it can be stated that learning mathematics is a gradual process. It is not matter that whether someone knows it or not. Learning mathematics is a continuum and it occurs gradually. Knowledge in the path of learning gradually changes from objective learning to abstract or subjective learning, from incomplete information to complete information, and from unsystematic thinking to systematic thinking. Thus, to prepare for this learning condition, it is necessary to use emotional creativity. As theorists have stated, the preparedness to express creative emotions is a desirable human trait that schools should take its teaching seriously.

Preparedness to solve problems and creativity for it is one of the most excellent human cognitive abilities, since cultivating this dimension of emotional creativity is closely related to the economic development and civilization and achievement of each country. Education should prepare learners to use creativity in solving their problem, because the world of the future needs creative people. Perkins (1991) argues that learner does not store information, but constantly tests his or her inner perceptions to create a proper structure of knowledge (quoted in Askari et al., 2011). Considering the effect of honesty on the achievement of mathematics course for third grade elementary school students, the results showed that the significance level of the test was $p = 0.000$ and below 0.05 and $r = 0.66$. Therefore, there is a significant direct and strong relationship between the two variables. Students' honesty can predict their academic achievement by 44%.

In explaining this result, it can be stated that the increasing achievement of industry and technology in the wider world is increasing, so the necessity of mathematics in the contemporary society is being felt more, since the first and most basic course of education for every human being is elementary education, and appropriate background and environment can led to creativity and self-expression. Self-expression and honesty play a major role in the growth and development of science and its explanation has a particular importance. Therefore, one of the goals of any educational system should be to cultivate honest and creative people, so that they can make appropriate and worthy decisions in unpredictable situations. Considering the effect of effectiveness on the achievement of mathematics course among third grade elementary school students, the results showed that the level of significance of the test was $p = 0.000$ and below 0.05 and $r = 0.68$, so there is a direct and strong relationship between the two variables and the effectiveness of students can predict their academic achievement by 47%.

In explaining this result, it can be stated that the achievement of industry and technology in the world is increasing and the necessity of elementary mathematics is being felt more than ever. Elementary education plays a key role in shaping mathematical concepts. Children become familiar with mathematical concepts by entering elementary school. Thus, achievement in mathematics depends on teaching-learning setting and situation. Children learn what they have in the classroom. Teachers and the educational system officials should teach the mathematical concepts for children minds and make them apply these concepts so that the student can be able to solve different problems in life by teaching each of these concepts. Schoenfeld (1989) also argues that if mathematics education focuses exclusively on basic knowledge and problem-solving strategies, it have implemented only a part of mathematical thinking.

In general, in the relationship between emotional creativity and the achievement of mathematics courses for third grade elementary school students, the results showed that the significance level of the test was $p = 0.000$ and below 0.05 and $r = 0.76$. Therefore, there is a significant direct and strong relationship between the two variables and their emotional creativity predicts academic achievement by 58%. In explaining this result, it can be stated that the ultimate goal of education is to enable a person to think clearly, logically and

constructively so that he or she can solve life problems and dilemmas properly and use the experiences of others and their past, and organize and use the results for the future. Our world is changing rapidly, and at this time, emotional creativity is the key that allows us to face problems, adapt with them, and ultimately succeed. Thus, many factors affect the academic achievement of academic achievement of students in mathematics and guiding them towards mathematics, empirical, and technical and vocational disciplines that the education system must make fundamental changes in teaching methods, textbook content and training of skilled workforce.

Based on Parker et al. (2004) and Bar-On (2000), emotional and social skills and abilities, known as emotional intelligence and creativity, are among the strongest predictors of academic achievement. The research conducted by Pedro et al. (2014) showed that the quality of students' academic life has a positive and significant effect on their academic achievement and it was also found that the quality of students' academic life is a good predictor for understanding their honesty. The present study was conducted only among third grade elementary school girl students in District 4 of Tabriz and it is necessary to conduct similar research in other districts and cities for further generalizability of this research and model. In development of teaching materials, it is recommended to use methods that rely on the active participation of students in lessons and discussions and give students enough time to present their findings, different and innovative solutions to solve the problems.

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