Mathematic anxiety, help seeking behavior and cooperative learning
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Abstract

Present project assess the effectiveness of cooperative learning over the mathematic anxiety and review the behavior of help seeking in first grade high school girl students. The experimental research procedure was in the form of pre-post tests after a period of 8 sessions of teaching. To measure the variables, the questionnaire of mathematic anxiety (Shokrani, 2002) and the questionnaire of help seeking technique (Ghadampour, 1998) were practiced (accepting or avoiding help seeking). To perform the assignment, 40 girl students from two schools were selected randomly and based on the highest mark of mathematic anxiety in pretest level and also after completing the two questionnaires; centered on matching process; they were placed in two groups of control and experimental. Teaching methodology of mathematic courses was offered in traditional method in control group but in experimental group, teaching methodology was cooperative learning method. After concluding the teaching sessions, once more, two questionnaires of mathematic anxiety and help seeking behavior were accomplished for the students. To analyze the data, the statistics method of analysis of covariance (ANCOVA) was implemented. The accomplished results indicated that cooperative learning method, in comparison with traditional technique, significantly decreases mathematic anxiety in students and increases help seeking behavior and decline the avoidance factors (p<0.05). These changes are, therefore, marked and meaningful in control group. Consequently, it is determined that the cooperative learning method can decrease the mathematic anxiety and increase help seeking behavior in students.

Keywords: Cooperative Learning; Mathematic Anxiety; Help Seeking;

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1. INTRODUCTION

The effect of nervousness in efficiency and sufficiency of people have been allocated into different categories such as mental pressure, anxiety, competence, disappointment, security, and fearlessness (Scamp, 1989). Although all these factors are important enough in achieving the objectives, the “mental pressure” and “anxiety” have allocated special place in teaching mathematic courses in high schools and even universities (Alamolhodaie, 2000). While mathematic is necessary in Trades; Social Sciences and even in Behavioral Sciences, most of the students avoid mathematic examination or even they demonstrate incapability to perform their proper abilities and competences, in other words they
are encountered with anxiety mathematic (Aboulghassemi, 2003). Mathematic anxiety is a mental condition presented in people when challenging the mathematic content whether in teaching and learning situation, in solving the mathematic problems or in assessing the mathematic behavior. This situation is usually provoked with too much anxiety, mental disorders and inattentiveness, imposed thought, mental tension, and consequently mental block (Alamolhodaie, 2000).

The consequences of mathematic anxiety lead to disappointment, depression, absentmindedness, misconception, and malady in information processing procedure (Aboulghassemi, 2003). It also decreases the convenient and effective behavior of people when confronting various situations (Darke, 1988). Mathematic anxiety ceases the reasoning ability of people (Buxton, 1981). The mathematic avoidance (Leon, 1992; Tobias, 1978) and even the effect on the students’ tendency toward mathematic (Broush, 1978) are particular aspects in this regard.

There are numerous factors efficacious in producing mathematic anxiety in which the most important ones are the learning situation and methods of teaching. Clut (1984) indicated that there is a meaningful relationship between the mathematic anxiety and the method of teaching. Therefore, to have an effective mathematic teaching session, appropriate teaching techniques should be reviewed.

Group discussion or in other words Cooperative Learning is one of the appropriate teaching techniques which lead to less anxiety and increase students’ self awareness from their learning procedure (Powel & Enright, 1990). Cooperative Learning offers a pleasant learning situation for all students, all students have equal opportunity, competition is amended as friendship, the spirit of cooperation and participation is reinforced, and all students are entitled to be thoughtful and creative (Keramati, 2001). In this technique students are gathered within small, peculiar groups in which they work together to reach their objectives and are responsible for their learning (Johnson & Johnson, 1997). Since the essence of mathematic problems require the use of different techniques in problem solving, the application of this method has an outstanding importance in teaching mathematics. Meanwhile the students, gathered in groups, can achieve different solving procedure through discussion and consultation and acquire various procedures through their teacher guidance (Ronald, 1997, quoted by Keramati, 2002).

Cooperative Learning is accomplished from Vygotsky’s Cognitive Developmental Perspective. There are four principles brought about his perspective playing a very important role in this technique of teaching (Slavin, 2006, translated by Sayed Mohammadi, 2008).

The first principle emphasize on the social nature of learning, according to which children through interaction with adult and more competent peers, start learning. Principle 2 emulates Zone of Proximal Development. Vygotsky (1978) clarifies that the approximate Proximal Development is the difference between the “current Proximal Development” – the child independent ability to solve the problem – and the advance “potential of Proximal Development” – the child ability to solve the problem with the guidance of an adult or cooperation with the a more skilled peer. Principle 3 is cognitive training and deals with processes by which a learner gradually acquires competency through interaction with a skilled person (an adult or an older and more skilled peer). Principle 4 addresses supportive learning. Vygotsky emphasizes on supportive learning through a medium in modern constructivist thinking. According to this perspective students should be given complicated, difficult, and realistic assignments, and then they have to be assisted to fulfill the assignments.

Kagan (1994) proposed the four key elements of positive interdependency, individual accountability, equal partnership and interaction. Slavin (1991) outlined three features of group reward, equal opportunities to achieve success in academic subjects, and individual responsibility for one’s own learning and that of others. In setting up groups, various viewpoints of the variables such as ethnicity,
language, culture, abilities, academic achievement and emotional relationships have been suggested. According to Keramati (2008) believed that when the members of group are not contiguous in language, culture, ethnicity, abilities, academic achievement, and personal specifications, the positive effects will be greater. In Slavin’s (1987) view, the number of the group members has to be from two to four in which an accomplished student, a weak student and the average ones are essential component of the group. Studies in cooperative learning point out that the efficacy of this approach outweighs that of traditional approaches (Sharan, 1980; Slavin, 1980). Cooperative learning has positive effect on the development of social skills, creation of friendly relationship among students (Mirzakhani et al., 2008; Soltani, 2005; Hossani Zavarani, 2005; Zourabadi, 2003).

Furthermore, this approach has prompted more positive behaviors in the students, it has also promoted interest to school and subject courses and has helped to boost self-confidence and self-respect in students (Sharan, 1980; Mirzakhani et al. 2008; Dehghan Shadkami, 2009; Zourabadi, 2003). The research findings suggest that cooperative learning enhances trust and mutual respect, declines anxiety, promotes meta-cognitive knowledge and encourages self-dignity and enthusiasm toward learning (Johnson & Johnson, 1989; Millis; 2010; Slavin & Karaweit, 1981; Ayoubi, 1998). Further outcomes of the cooperative learning contemplate more attention and concentration; improve memory, understanding and insight; expand analytical resolution and judgment on the part of scientific knowledge (Johnson & Johnson, 1999). It also enhances learning and improvement in all subjects such as LEFL (Learning English as a Foreign Language), Mathematics, Chemistry, Physics, from basic to university courses (Mobini, 1998; Mashhadi, 2000; Keramati ,2009; Hossani, 2005; Ammpour, 2006; Ghorbani ,2001). The main important enlightened factor in this approach is the help each learner offers in order to obtain the instructional concepts. Nelson Le-Gall (1987) has elaborated on the instructional help seeking and defines it as a guideline to dominant the learning difficulties and to improve the profound learning. Students are able to determine their learning difficulty and precede them through questioning others and help seeking. This help seeking has numerous benefits for boy and girl students in any age, any level of capability, ethnicity, and social and classroom background.

Help seeking can be considered as an integral part of cooperative learning. Cooperative learning evolves four groups of activity designed to improve the capabilities of the students engaged in small groups.

1. The activities related to the surroundings such as remembering the name, the interest, and the desire of the co-mate.

2. The activities related to the basic communicative skills such as listening, consideration, parallel cooperation by any organ of the body (in cooperative learning, a diagram of social skills is prepared to be used by the small groups).

3. The group activities to generate the skills of help seeking are similarly of value. To know how to solve a problem when the students do not know in what way they should act, how the students should ask for help and how students can help other students, to know how to encourage students to ask questions and how to use some key terms to demonstrate students’ ambiguity and being tangled are significant activities in this regard.

4. The activities to yield capabilities in the students to present explanation (Karabenick & Newman, 2006 ,quoted from Webb et al., 1995).

Nelson Le-Gall (1981) that in small groups, using others as resources, as cognitive activities, could be an approach to solve problems; it, as well, may accelerate scientific development and social skills in others. Formation of these groups to accomplish the mathematic activities among the under discussion learners and succeeding to generate discussion among them, under the teacher conscious guidance, can
yield suitable opportunity to create cooperative learning among the students. This movement can improve the implicit module and mental readiness in the students; consequently, it yields expansive mathematic knowledge of the students. Therefore, the learners have the prospect to increase their self-competence and confidence of learning mathematic in a partially non apprehensive situation in a congruent group established with students with high mathematic anxiety. This also creates this believe that they have the comparative capability and sufficiency to learn mathematic concepts (Alamolhodaie, 2000).

Based on the appropriate and operational effects of cooperative teaching/learning and the positive effects of help seeking as one of the learning resources in comprehending subject courses and also the negative and demolisher effects of mathematic anxiety formed in learners; the present research will elaborate on the role of cooperative learning in diminishing the amount of mathematic anxiety and the help seeking behavior in girl student.

2. METHODOLOGY

2.1. Design

Since the objective of this research is to consider the effects of cooperative learning on mathematic anxiety and the help seeking behavior, the research proposal is based on the pre-post tests on 2 experimental and control groups.

2.2. Sample

Subjects of the research are all first-grade girl students in district 4, Karaj public high schools in academic years of 2009-2010. To select the subject groups, initially two schools were randomly selected among girl high schools. Afterwards the questioners of mathematic anxiety and help seeking were distributed to all first grade high school girl students (pre-test). After data extraction based on the highest marks in mathematic anxiety questionnaire, 20 students were selected for each of control and experiment groups on the basis of matching procedure.

2.3. Instruments

The scales of mathematic anxiety were two factors of mathematic examination anxiety and mathematic nature anxiety (Shokrani, 2002). In this scale 18 items of mathematic anxiety were itemized in which 9 of them were concentrated on one factor, and the other 9 items highlighted the other factor. Each question was furnished with four choices of “3 = thoroughly agree”, “2 = agree”, “1 = disagree”, and “0 = thoroughly disagree”, in which the total of these marks indicate the mark in mathematic anxiety. The range of mathematic anxiety mark is between “0-54”, in which the higher marks designate the higher mathematic anxiety, and the lower marks suggest the lower mathematic anxiety. The perpetuity of this test is based on the Cronbach’s alpha coefficient on 355 students in the initial phase of the study and the reliability is computed as 0.93. The questionnaire of help seeking behaviors, encompassing two elements of help seeking acceptance and help seeking avoidance, was based on the concepts of Rayan and Pintrich (1997) being prepared by Ghadampour (2008). It sustained 14 items in which 7 items (1, 3,5,7,11,13 and 14) conveyed help seeking acceptance and 7 items (2,4,6,8,9,10 and 12) transferred help seeking avoidance. To mark these items the Likert 5-grade scale of “thoroughly agree” to “thoroughly disagree” is exploited. In order to measure internal consistency of research instruments, Cronbach’s alpha coefficient was measured as 0.69 for help seeking acceptance and 0.63
for help seeking avoidance. Furthermore Ghadampour (1998), in his research, attained alpha coefficient for the internal consistency measurement as 0.68 in both help seeking acceptance and help seeking avoidance in 200 boy-students.

2.4. Procedure

After the execution of 2 questionnaires of mathematic anxiety and help seeking as the pre-test, and selection of experimental and control groups, the instructors and the members of the research group are acquainted with the proposed cooperative learning model centered on learning together and mathematic Olympia. When the 8 training sessions were executed, once more the questionnaires of mathematic anxiety and help seeking, as the post-test, were performed on to the 2 experimental and control groups. The process of a sample teaching session on “equation and analysis” based on cooperative learning:

A. 5 minutes for the attendance issues
B. 15 minutes for revision and elucidating the last session assignments. One from each group (e.g. forth members of the groups) is invited to the board and discuss the problems; this technique demonstrates that all the members of the group have participated in solving the problems, it also illustrates if the group has consented on the problems or a minor variance is present. This leads to the fact that the members of the groups are confident about the correctness of the solutions or will find out their occasional difficulties.
C. 10 minutes for teaching the new subject matter, the formula, and the terms, following by the contriving the related examples.
D. 5 minutes for shifting groups and allocating responsibilities of the members in each group.
E. 50 minutes for solving the presented problems in each groups centered on learning together and mathematic Olympia. The process is as the followings: first some questions at the understanding levels of the students are presented to them. Students in each group collectively and with regards to their responsibilities in the group try to solve the problem and reach to a similar conclusion. Their difficulties, if exists, is eliminated by the group members. Finally one member of the group will go to the board and elucidate on the group conclusion. In case of similarities with other groups conclusions or the wrong conclusion, it will be argued. Then some problems on the similar field is presented, problems are stated and the same process will be repeated. To reach the correct solution, all members of the group discuss the issue and give evidence and if there occur any difficulty and if the member of the group asked for help the teacher would assist them.
F. The 5 last minutes is allocated for next session assignments in different areas of cognitive fields.

The process of a sample teaching session on “equation and analysis” based on tradition way of learning:

A. 5 minutes for the attendance issues
B. 15 minutes for revision and explicating the last session assignments by the teacher, the volunteer students, or the student chosen by the teacher.
C. 20 minutes for teaching the new subject matter, the formula, and the terms, following by the contriving the related examples and answering to the questions.
D. 20 minutes for accomplishing assignments of the new subject in different areas of cognitive fields (comprehension, application, etc.) in the classroom and by the students individually.

E. 25 minutes for solving problem on the board by voluntary students or student chosen by the teacher, or the teacher him/herself, and elucidating the occasional difficulties.

F. The 5 last minutes is allocated for next session assignments in different areas of cognitive fields.

3. RESULTS

Two pivotal hypotheses were experienced in this research:

1. In learning mathematics, the student being taught in cooperative learning, compared to the traditional teaching, are confronted with less mathematic anxiety.

2. In learning mathematics, the student being taught in cooperative learning, compared to the traditional teaching, are encountered with more help seeking behavior and retain low help seeking avoidance.

To evaluate the hypotheses and to analyze the data, the methods of uni-variate covariance (ANCOVA), was implemented.

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>preanxiety</th>
<th>prehelp</th>
<th>preavoid</th>
<th>postanxiety</th>
<th>posthelp</th>
<th>postavoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>experimental</td>
<td>Mean</td>
<td>44.5000</td>
<td>30.0000</td>
<td>17.6000</td>
<td>16.4500</td>
<td>32.6000</td>
<td>12.9000</td>
</tr>
<tr>
<td>control</td>
<td>Mean</td>
<td>43.8000</td>
<td>27.9000</td>
<td>17.9500</td>
<td>28.6000</td>
<td>28.1500</td>
<td>16.7000</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>2.39737</td>
<td>5.12887</td>
<td>6.23635</td>
<td>9.52780</td>
<td>3.04830</td>
<td>3.72898</td>
</tr>
</tbody>
</table>

Results in Table 1 suggest that in math anxiety scale of control and experiment group in post-test phase there is a considerable cut compared with the post-test phase. This discrepancy is more evident in experiment group than in control group. Similarly, in help seeking acceptance scale of experiment group compared with control group more increase is evidenced and in help seeking avoidance more decrease is reported. In the next step, to test the research hypotheses, covariance analysis of collected data in scales of math anxiety, help seeking and avoidance behaviors was examined. The results of covariance analysis test in math anxiety scale are presented in Table 2.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Observed Power b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre anxiety</td>
<td>2.127</td>
<td>1</td>
<td>2.127</td>
<td>.026</td>
<td>.873</td>
<td>.053</td>
</tr>
<tr>
<td>group</td>
<td>1456.141</td>
<td>1</td>
<td>1456.141</td>
<td>17.737</td>
<td>.000</td>
<td>.984</td>
</tr>
<tr>
<td>Error</td>
<td>3037.623</td>
<td>37</td>
<td>82.098</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .327 (Adjusted R Squared = .291)
As it is illustrated the effect of the treatment (cooperative learning) on math anxiety with confidence level of 0.95 is significant. Accordingly the means of control and experiment group in math anxiety dependent variable are significantly different. In other words, the first hypothesis, whereby compared with students who are taught in traditional approach, students who in mathematics are taught in cooperative learning approach have less math anxiety, is confirmed. In Table 3 and 4, the results of covariance analysis of help seeking and help avoidance variables are provided.

Table 3. analysis of covariance on post test help seeking as dependent variable

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Observed Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre help seeking</td>
<td>30.879</td>
<td>1</td>
<td>30.879</td>
<td>4.490</td>
<td>.041</td>
<td>.541</td>
</tr>
<tr>
<td>group</td>
<td>155.128</td>
<td>1</td>
<td>155.128</td>
<td>22.556</td>
<td>.000</td>
<td>.996</td>
</tr>
<tr>
<td>Error</td>
<td>254.471</td>
<td>37</td>
<td>6.878</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .474 (Adjusted R Squared = .445)

Table 4. Analysis of covariance on post test help avoidance as dependent variable

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Observed Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre avoiding</td>
<td>52.732</td>
<td>1</td>
<td>52.732</td>
<td>4.814</td>
<td>.035</td>
<td>.570</td>
</tr>
<tr>
<td>group</td>
<td>139.495</td>
<td>1</td>
<td>139.495</td>
<td>12.736</td>
<td>.001</td>
<td>.935</td>
</tr>
<tr>
<td>Error</td>
<td>405.268</td>
<td>37</td>
<td>10.953</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .327 (Adjusted R Squared = .291)

According to Table 3 and 4 the effect of treatment (cooperative learning) on raising help seeking and decreasing help avoidance is significant. Consequently, there is statistically a significant difference between the means of control and experiment in help seeking and help avoidance variables (post-test). In other words, compared with the traditional approach, cooperative learning was more influential in elevating help seeking behaviors and decreasing avoidance in students. Hence, the second hypothesis is confirmed.

4. DISCUSSION

The (ANCOVA) in the scale of mathematic anxiety, indicated that student being taught in cooperative learning compared to the students being taught in traditional learning, are encountered with less mathematic anxiety. In cooperative learning the process of learning is much more important than the learning itself. Nobody is reprimanded and blamed for less of knowledge in the subject matter. Students are not compared with each other; consequently competition has no role in this method. In cooperative groups, the students have the opportunity to learn the difficult concepts in mathematic through questioning their peer-mate, therefore they develop confidence in their capabilities of learning mathematics and reduce the mathematic anxiety. In this training environment, the students are confronted with serenity, security, lack of contempt and horror.
Slavin and Karaweit (1981) specified that the anxiety is reduced in cooperative sessions since students are not criticized. Johnson and Johnson (1989) believed that the reduction of anxiety in the cooperative situation is due to absence of competition among the school-mate. Panitz (1999) studied the effects of cooperative learning in mathematic courses; he revealed that in this method, not only the mathematic horror and anxiety is reduced but also the interest and pleasure of learning mathematic is supplemented. Vannasaab (2000) has achieved the similar results in his research. Flowers & Rits (1994) and Millis (2010) accomplished the fact that cooperative learning for mathematic courses is the cause of mathematic anxiety reduction. Schmidt (2007) when researching on anxiety and attitude of the Math students toward mathematic courses determined that the mathematic anxiety is reduced in cooperative sessions meaningfully.

In second hypothesis, the covariance in the scales of help seeking acceptance and help seeking avoidance illustrated that the cooperative learning method, compared with the traditional method increases help seeking behavior and lessens the help seeking avoidance in the students. The sessions managed in cooperative method have more profound organization and with the opportunities adjusted for the students, the essence of cooperation, solidarity, and participation is conveyed in students. With the objective of attaining intelligence, insight, and knowledge, the students will acquire the ability to work in cooperative groups, collaborate with each other, and examine the assistance of the others. Through discussion, consultation, and help seeking, the students acquire the ability to abolish their learning problems, propose different solutions, and learn the different guidelines from their teachers and their school-mates. This method provides the situation for the students to understand that they cannot achieve absolute success by themselves, and they need the help of their peer-mates to do their assignments.


5. CONCLUSION & RECOMMENDATIONS

The present research confirms that cooperative learning method culminated to considerable reduction of mathematic anxiety, even in a short period of time. Consequently, based on the achieved results, math teachers can form cooperative groups to reduce mathematic anxiety through discussion, dialogue, and interaction with the students. On the other hand more interest can develop in the students. Furthermore findings have illustrated that cooperative learning leads to extra exploitation of help seeking behavior and fewer help seeking avoidance. Students in cooperative groups have the opportunity to request help from their co-mates better comprehension of the subject or organize their assignments; something which does not exist in traditional teaching method, since, teachers, because of the insufficient time, are not able to answer to all students’ questions. Therefore, teacher can encourage students to ask for help to better understanding of the difficult subjects through forming cooperative groups; on the other hand students will learn to ask for help in different occasion whenever help seeking transpires. Based on the findings, it is recommended that other researchers; before and after of the implementation of the experimental plan; elaborate on the style of help seeking (instrumental or execution) being used by the students and determine what kind of changes have taken place in different styles after the implementation of research plan. Since mathematic anxiety is a widespread situation in students of different grades, it is suggested to involve students of both sexes in
all grades, tenet and branches to compare them with each other in further research. It is also recommended to all the authorities in edification, training, and education to acquaint the teachers with this method in ‘on the job training’ courses and provide the situation for implementation of this method in schools. It is proposed to schoolmasters to approach the cooperative groups in classroom through the teachers’ encouragement and apprise of students and parents. Last but not the least, it is suggested to the compilers, writers, and authors of the mathematic (1) books to provide changes proportionate to the cooperative learning method.

REFERENCES


