AENSI Journals

Advances in Natural and Applied Sciences

ISSN:1995-0772 EISSN: 1998-1090

Journal home page: www.aensiweb.com/ANAS

The Study of the Effect of Teaching Self-Regulated Learning Strategies Components on Students' Math Performance

[1]Khadijeh Hamidyan, [2]Rashid Zolfaghari Zaferani, [3]Asghar Sharifi

[1]MA, Department of Math and Educational Researches, Rudehen Branch, Islamic Azad University, Rudehen, Iran.
[2]Assistant Professor, Faculty Member, Department of Counseling, Rudehen Branch, Islamic Azad University, Rudehen, Iran.
[3]Assistant Professor, Faculty Member, Department of Counseling, Rudehen Branch,Islamic Azad University, Rudehen, Iran.

ARTICLE INFO

Article history:
Received 25 June 2014
Received in revised form
8 July 2014
Accepted 31 August May 2014
Available online 15 September 2014

Keywords:
self-regulation components, self-regulated learning strategies, math performance, high school students

ABSTRACT

This article is drawn from the research that aimed to investigate the effects of training self-regulated learning strategies components on mathematics performance of female secondary students and was conducted in the academic year 2012-2013 in Qarchak city. The research method is quasi-experimental with pre-test - post-test of control group. The study population includes the female high school students of Qarchak which were 4583 students, 54 of which were selected by multistage random sampling method And randomly divided into two groups. Ten one-hour sessions, students were trained in self-regulation, but control group received none. Descriptive statistics of the data (box plot, standard deviation, mean) and were analyzed using inferential level ANOVA and Toki's test. Results of this study showed that self-regulated learning components of learning strategies have a positive impact on math performance. The results showed that the training of self-regulated learning strategies can be effective and useful strategies for improving student sto given math function.

© 2014 AENSI Publisher All rights reserved.

To Cite This Article: Khadijeh Hamidyan, Rashid Zolfaghari Zaferani, Asghar Sharifi., The Study of the Effect of Teaching Self-Regulated Learning Strategies Components on Students' Math Performance. **Adv. in Nat. Appl. Sci.,** *8(9): 40-46, 2014*

INTRODUCTION

Experts in the field of mathematics education, believe that life in the sophisticated and advanced world of today requires the thought of having a dynamic and productive creative thinking and effective learning mathematics can help formation and growth of thinking (Schonfeld, 1989; Seyf *et al* , 1386). Accordingly, students' performance in mathematics is very important for directors of education (Kristamize, 2008). In the 1980s, research in this field has focused on interaction factors that jointly affect the performance of students learning. Burke (1986, cited in Webb, 1992), considers performance measurement as data collection process through systematic observation, to make decisions about a person. Typically, to measure students' ability to answer questions consistent with the purpose of teaching specific content is called performance measurement which tests of performance in the classroom occur in order to gather evidence of student achievement , to inform them of this development, facilitate learning and give evidence of their success (Dastan , 1389). Mathematical function is the most important component of a set of numbers, number facts, understanding mathematical concepts and the ability to follow procedures (Docker, 1998, quoted in Arizi, Taji and Abedi, 1384). Development of mathematical concepts in mathematics are formed even before the start of school education , learners from the outset certain learn basic concepts such as absolute size (large, small) , the relationship of the whole.

These skills and abilities are the basis of learning mathematics (Ginsburg, 1997; quoted Arizi, Taj and Abedi 1384). Also, in many psychological theories related to mathematics education, information organization and control of mental processes through the schemes formation of the students is emphasized (Alam-al-Hoda, 1379, quoted in Arizi, Taj and Abedi, 1384).

In the past decade , individual differences were considered as the main cause of the differences between students ' math performance, but in recent years , particularly with the introduction cognitive perspectives , new ideas about students ' learning problems and shortcomings has been an important part of learning and how to use learning strategies . The difference is not in the inherent capabilities of students, but also in processing information. Hence, enhancing and improving students ' academic performance is provided using appropriate methods of teaching, learning problems. Regulated learning strategies in recent decades are one of the variables

Corresponding Author: Rahim Khadijeh Hamidyan, MA, Department of Math and Educational Researches, Rudehen Branch, Islamic Azad University, Rudehen, Iran.

that has been of interest to researchers and experts. Today that consensus has been formed for the students good mathematical performance, they need to have good math skills, self-regulation, cognitive and motivational orientations (Lynn Brink and Pintrich, 2002).

Anderson and Bratin (2011) in their study expressed strategies for teachers to use different settings to enhance the effectiveness of their teaching and facilitate student learning and success. Pintrich (1999) gives a comprehensive definition of self-regulated learning. He knows this kind of learning as an active process in which students are active and structured learning objectives for their choice and then try to identify, motivate and regulate their own behavior, monitor and control. Synonyms are applied for self-regulation, such as the directedness, self-control, self-regulation and self-control. As self-regulation has several synonyms, it has several different definitions that result from different theoretical perspectives. But the term is not limited to cognitive theory of self-regulation of conceptual and behaviorism, since behaviorists considered behavioral strategies in the self-regulation and overt responses for them include self-monitor their own learning and reinforcing as elements of self-regulated behavior (Shank , 2001) .

Researchers and theorists have proposed various models for self-regulation; self-regulation model of Zimmerman is a theoretical basis for explaining the effects of self-regulated on learning (2000). He offers a model based oncognitive - social theory a self-regulated process and believes in cycling of self-regulation process in the study that occurs in four stages as follows:

Self-evaluation and self-monitoring , goal setting and strategic planning , strategy implementation and monitoring , strategic outcome monitoring.

Students who are more self-regulation are theoretically more aware about their needs and can meet them adequately and make their learning more effective .they are also better able to gain the results that can be controlled , and a treasury of learning strategies are more appropriate for different learning situations (Winnie , 1997).

Cognitive - Social Theory of self-regulation:

The self-regulation is proposed by cognitive psychologists and researchers - including social propounded Bandura 1960 (Kadivar , 1380). According to the cognitive - social perspective, it is assumed that self-regulated learning is formed in a three-way interaction, the person , environment, and behavior (Fig. 1). Self-regulation is not determined solely by personal factors but also is influenced by environmental and behavioral factors. Effects of these three factors do not equally apply to each of the three factors, depending on the current situation or the specific conditions; they may have more effective results. However, self-regulated learning occurs when a person can employ personal processes for regulating behavioral strategies and learning environment (Zimmerman, 1990; quoted in Dastan, 1389).

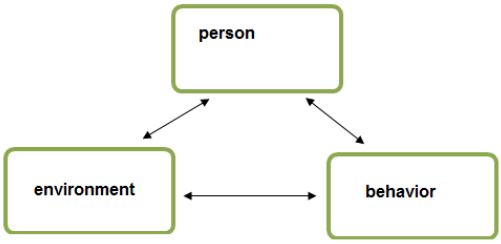

Fig. 1: The determinants of mutual self-regulated learning from a cognitive- social perspective (Samar, 2007).

Self-regulating Components:

Theorists agree upon basic components of the self-regulated learning and resource management components. These components include cognition, metacognition, motivation and management(Figure2).

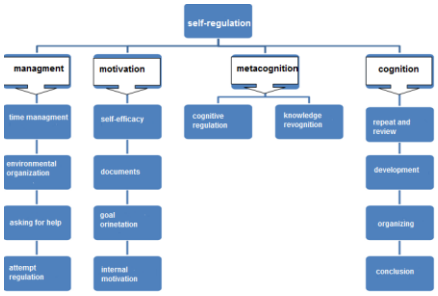

Fig. 2: components of self-regulated learning (Shriver *et al*, 2003 quoted in Dastan, 2010)

A) Cognitive strategies (shallow and deep): they can be seen as processes or practices relating to the acquisition, maintenance or use of the information (Nabar , 2004, quoted in Rasouli , 2010).
B) Meta-cognitive strategies are defined as conscious awareness and reviewed whether the learning objectives have been achieved or not. Meta is the choice of appropriate strategies for achieving the objectives (Malis *et al*, 2007; quoted Dastan, 2010). Metacognitive strategies to help individuals increase learning efficiency .students can find their way in learning process by developing learning capacities of meta-cognition.
C) Resource management strategies help students adapt to their environment and alter their environment to meet their needs and their goals (Ryan and Pintrich, 2004, quoted Karshky, 2008).
D) Motivational strategies: Hugh(2000) argues that motivation encourage the learners to select target and learning strategies, monitor and evaluate their progress. Infact, motivationis the driving force for the successful implementation of the other three strategies of self-regulation(quotedfrom Rsouli, 1389).

Characteristic of self-regulated learners:

Vanvick (2004) named five characteristics of self-regulated learners, self-regulated learners , knowledge holders , knowledge users , self-motivated , critical thinkers who has feelings of responsibility towards learning (are committed). Self-regulated learners do not necessarily have all these features, although they can be helped to achieve these properties. Therefore, in recent years the relationship between self-regulated learning strategies on mathematics performance is one of important areas. We aimed to determine the effectiveness of self-regulation component on mathematical performance.

Research background Studies on self-regulation strategies and academic performance, especially in mathematics is considered by many scholars and experts.

Chits Mathew (2013) considered the relationship between self-regulating taught by the teachers in cognitive fields. A similar model has been confirmed about the relationships between activities of regulated learning strategies and student's individual factors, including references to primary school mathematics self-efficacy beliefs in academic values and sense of fun. Iberian and Luken study (2010) showed that people who make use of better strategies to study basic subjects, are more likely to have a significant and long-lasting performance. They facilitate learning and manage their behaviors and thoughts, and avoid behaviors that damage promoting academic performance. They have appropriate strategies in any learning situation, and they are capable of forming personal skills in learning. When faced with a challenge to learn, they know and understand that what strategy to use to increase the performance and stability of the material in their mind. They targeted the use of metacognitive strategies.

Crista Maze (2008) in a study examined the relationship between cognitive self-regulation and solving mathematical problems. 264 students participated in this study in mathematics and statistics and completed a questionnaire on self-regulation of learning strategies. Some of these students participated in two sessions of problem solving classes and have received training about planning, knowledge management and the use of rational and empirical arguments. Students who received the training solved the problems much better than others who did not.

Nota *et al* (2004) in a research about self-regulation strategies studied the relationship between academic achievement and academic mutated subsequent test. His sample consisted of students in the last years of high school in Italy. In this study, an interview program was used on cognition, motivation and self-regulated learning strategies in the classroom and non-classroom behavior. The results show that these strategies in Italian language courses, mathematics, and technology had a significant effect on learning lessons and university exams and other classes mean. Motivational self-regulation strategies were significant predictors of success in the final examinations for obtaining a high school diploma.

Pajars *et al* (2001) found that girls are higher than males with homework and organizing media strategies. The results indicate that cognitive function in women after training is better than boys (quoting Samadi, 2004). Weinstein and Hume (1998), have reported a number of studies with the results that teachers can help students through teaching learning strategies skills to be more successful learners and can play a more active role in their education (quoting Seyf, 2007).

Zimmerman's (1990) analysis of gender differences observed that girls among the strategies that significantly take note of self-monitoring, organization and planning of media attention more than boys.

Pintrich and Digrot (1990) also believed that boys and girls used different types of strategies.

Karami *et al* (2005) found that the use of metacognitive strategies affects academic performance. Metacognitive strategies means to guide and monitor cognitive strategies and a skilled learner is one who is aware of the correct methods and strategies and uses them properly. Folladchang (1386) conducted a research about meta-cognitive skills and came to the conclusion that the program has a positive effect on academic achievement in mathematics.

Samadi (1383) noted the role of metacognitive strategy training on reading comprehension and speed of learning and solving math problems. They concluded that metacognitive skills are a major cause of failure students in tasks. Samadi (2004) research on the role of metacognitive knowledge in solving mathematical

Advances in Natural and Applied Sciences, 8(9) August 2014, Pages: 40-46

problems, concluded that teaching students metacognitive knowledge leads to better performance and achieve higher mathematical performance.

The overall objective of the study: To determine the effectiveness of self-regulated learning strategies on high school students' mathematics performance. Hypothesis: self-regulated learning strategies affected high school students' math performance.

Research Methodology The study design and methods: Present research investigated causal relations self-regulated learning strategies on performance variables by a mathematical model from Vignette and urethane (2008). Since this research was concerned to investigate the effectiveness of self-regulated learning strategies on mathematics performance, therefore, quasi-experimental study were used with pre-test - post-test with two experimental and control groups. Finally, this study was conducted in three stages. 1. before the second test. 2. Self-regulated learning strategies teaching to students in the experimental group 3. Post-test. After Mathematical operation on both the pretest, the experimental group students were trained for one hour sessions by research method of self-regulated learning strategies of mathematics. Further research to evaluate the effectiveness of the training, the mathematical function tests were performed on both experimental and control groups.

The sample and sampling methods: The subjects of the study were 54 female high school students in the academic year 1391-1392 enrolled in two classes of Qarchak city and were selected by multistage random sampling. Thus, at the first stage from a list of high schools for girls in city of Qarchak including a total of 14 high school girls (including 4583 students) who were randomly assigned to a high school and were selected with 402 students in 12 classes in four majors . Then, one group was randomly selected (third grade). At the final stage two -thirds of the class were considered with random assignment to experimental and control groups (Table 1).

Table 1: the demographic characteristics of the control group.

volum	Intelligence Error	Intelligence SD	intelligence Mean	group
27	1.98	11.35	109.79	experiemnet
27	1.79	10.93	110.05	control

As can be seen in Table 1, both groups, the mean and standard deviation of IQ is very close and does not see much difference between the two groups in terms of IQ.

Introduction of data collection :

Mathematical function tests: pre-test and post-test developed by the researchers was used as tools to measure mathematical performance. Test of the validity of is superficial and uses feedback from four math teachers (average experience of 15 years teaching mathematics) teaching high school of design, evaluation, and judgment to be confirmed. To evaluate the reliability of both tests (14 questions) was conducted on a sample of 26 students and the test questions showed that eliminating any question changes the reliability of the test in the range of 0/81 to 0/83. The alpha coefficient of 0/83 indicates the internal consistency of the test. Two questions about the reliability of the test was eliminated at this stage and the test questions indicate that removing any remaining questions changes the reliability of the remaining 12 questions in the range of 0/74 to 0/79. The alpha coefficient equal to 0/79 indicates the internal consistency of the test.

Results:

After reviewing the default assumption about normally distributed variables of mathematics performance (Table 2) by Kolmogorov - Smirnov test (KS) and Loontest was used for examining the consistency of variance (Table 3) and at the end in order to test the hypothesis and study the differences the average one-way ANOVA and post hoc Tokay test and ANOVA test (HSD) was used.

Table 2: Indicators of the normal distribution of mathematical performance.

post-test		pre-test		group
control	experiment	control	experiment	
0.548	0.679	1.037	0.927	Z amount
0.925	0.745	0.233	0.357	Significance level

Results of Table 2 shows the values of z and obtained significant for all four variables in relation to the pre-test and post-test experimental and control groups which all were more than 0/05. This indicates that the null

hypothesis is accepted and research variables distribution is the same with normal distribution. Normal distribution of the data can be used as the most popular means of descriptive statistics can be used in areas of central tendency.

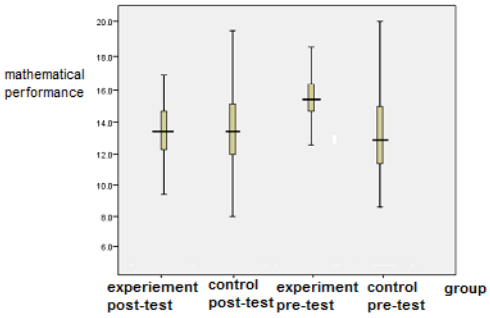

Chart 1: two variables of mathematical performance

According to Chart 1 of mathematical performance related to post-test experimental group is shorter than the other tests, this represents a reduction in variance of the test. The plot shows an increase in the minimum grade and middle line represents the median increase in the post-test scores of the experimental group.

Table 3: test for homogeneity of variances of the variables.

sig level	Max F	Freedom Degree inside the group	Freedom degree among the groups	variable
0.460	0.868	104	3	math performance

According to the results of Table 3, it can be seen for all variables P> 0/05, so there is no significant difference between the variances indicating that the variances are homogeneous.

Table 4: ANOVA test of mathematical performance.

Sig	F	Mean Square	Degree of freedom	Mean Square	
0.012	3.834	32.559	3	97.676	inside group
		8.493	104	883.241	among group
			107	980.917	total

ANOVA results in Table 4 indicated that the observed F value is greater than the critical value and the significance level is P <0/05, so it is concluded that the relationship between mathematics performance scores of four there was significant.

According to Table 5, post hoc Tokay test results about mathematical performance the variable, indicate that paired comparison (two by two) test results, post-test experimental group in all cases is greater than other means. The significance level is P <0/05, so there is a significant difference between the experimental group posttest.

Discussion and Conclusion:

The study of the results in Table 5 indicated that training in the use of components of self-regulated learning strategies on mathematics performance of secondary school girls were effective and so research hypothesis is confirmed.

So far, many studies have been done about the direct effect son academic performance and self-regulated components of a mathematical function which showed a strong and positive impact on academic performance and yield components of self-regulation strategies and mathematics.

The results of the study are consistent with findings of the studies byIberianLuken(2010), KristaMuis(2008), Samar(2007), Nuta and colleagues (2004), Weinsteinand Hume(1998), Pajars*et al*(2001), Zimmerman(1990) ,Pintrich and Dogrit (1990), hands(1389), messenger(1389), Karami*et al*(1384), Folladchang and Folladchang (1384), Samadi (1383).

Increase in math scores of students in the experimental group happened while students did not spend more time learning mathand did not change their instructional time, therefore, teaching self-regulated learning components to the students helped actively in their learning and have a positive role to achieve higher performance . Learning self-regulated learning strategies to teach the learner to learn what to do and how to have higher productivity a subject -specific characteristics of your individual circumstances. In this respect,

Advances in Natural and Applied Sciences, 8(9) August 2014, Pages: 40-46

independence in learning, teaching and behavior management of students should be considered as the main purpose and students can apply to the regulation and control use of information, skills and learning.

So knowing what is effective in improving the performance can contribute to the overarching goal, for their own learning and it is noteworthy to have a precise application of appropriate strategies.

In other words, they learn how to learn. This hypothesis an be deduced from the findings and the students learn skills such as acquisition, organization, storage, and ease of operation of their knowledge, planning, control, manage, regulate the time, to try and get help from other people' schoice of medium, anxiety control and avoid procrastination or neglect and taking notes, high lighting and reviewing the compound again and they practice these factor swill improve math performance.

Table 5: post hoc Tokay test math performance.

Level of Confidence 95%		Significance level	Standard Error	Mean Difference	group 2	group 1
higher bound	Lower Bound					
1.960	-2.182	0.999	0.7932	- 0.1111	pre-test control	pre-test experiement
- 0.281	-4.423	0.019	0.7932	-2/3519 *	post-test experiement	
1.608	-2.534	0.937	0.7932	-0.4630	post-test contro	
2.281	-1.960	0.999	0.7932	0.1111	pre-test experiement	pre-test control
- 0.170	-4.312	0.029	0.7932	-2.2407 *	post-test experiement	
1.719	-20/423	0.971	0.7932	-. 3519 *	post-test contro	
4.423	0.281	0.019	0.7932	2.3519 *	pre-test experiement	post-test experiement
4.312	0.170	0.029	0.7932	2.2407 *	pre-test control	
4.443	0.281	0.048	0.7932	2.3529 *	post-test contro	
2.534	- 1.608	0.937	0.7932	0.4630	pre-test experiement	post-test contro
2.423	-1.719	0.971	0.7932	0.3519	pre-test control	
4.443	0.281	0.048	0.7932	2.3529 *	post-test experiement	

In other words, the strategies in order to study people's minds enable them to become proficient in learning and self-study. Andin order to plan It seems that long-term practice of these skills increased mathematics performance. While teacher is teaching or studying, they try to make sense of information, creating alogical connection with the previous data, quality control and the process of creating an appropriate learning environment appropriate learning and practice math. Since individuals with higher cognition are informed about their learning and aware of this, if the circumstances do not obtain the desired success, it certainly leads in his weak performance. Maybe when students are studying for a test, new and important matters do have no deep understanding about how to be in a strange situation, due to lack of self-regulatory strategies. And according to the time spent effective and sustainable learning is not achieved. Using the self-regulatory skills that learners will be able to manage time and resources, and to better understand the material faster and retain information longer.

REFERENCES

Abar, B., E. Loken, 2010. Self-regulated learning and self-directed study in a pre-college sample. Learning and Individual Differences, 20.

Ames, R., 1983. Help seeking and achievement orientation: Perspectives format attribution theory. In; B.M. Depaulo, A. Nadler, J.D. Fisher (Eds), New directionsin helping, (Vol.)2: help-seeking(pp**165.**-1**86**).NewYork:AcademicPress.

Andreassen, R., I. Braten, 2011. Implementation an defects of explicit reading comprehension instruction In fifth-grade classrooms. Learning and Instruction, 21.

Arizi, H. and Abed, A. M. Taji, 2005. The relationship between counting ability, visual attention, auditory perception and cognitive science with mathematical competence in preschool children in Isfahan. Journal of Educational Innovation, Year, 4(13): 148-133.

Chatzistamatiou, M., 2013. Motivationalandaffectivedeter-minants of self-regulatory strategy use in elementary school mathematics. Educational Psychology.

Coutinho, S.A., G. Neuman, 2008. A model of metacognition, achievement goalorientation, learning style and self- efficacy. Learning Environments Research, 11.

Dastan, M., 2010. The role of achievement goals and self-regulatory strategies in mathematical problem solving and mathematics performance of first grade students in Yazd high schools. M.A. thesis. Department of Educational Psychology, Tarbiat Moallem University of Tehran.

Duek, C.S., 2000. Self-theories: Their Role in Motivation, Personality and Development; Philadelphia: Psychology Press.

Folladchang, M., 2005. Assessing the effects of cognitive training on academic achievement in mathematics. Quarterly educational innovation, Year IV, 14: 149 -162.

Folladchang, M., A. Razavie, M. Kheir and S. Alborz 2007. The effect of cognitive processing problem. Journal of Social Sciences and Humanities, University of Shiraz, 26.3: 95-109.

Karshky, H., 2008. Motivational and self-regulated learning model of environmental perception on the basis of high school students in Tehran thesis of Educational Psychology.

Pajares, F., M.D. Miller, 1994. Role of self-efficacy and self-concept beliefs in mathematical problem solving: A path analysis. Journal of Educational Psychology, 86.

Pajares, F. and Viliante, G., 2001. Gender Differences Writing Motivational and Achievement of Middle School Student: A Function of Gender Orientation"; Contemporary Educational Psychology, 26.

Pintrich, P.R., 1999. The Role of Motivation in Promoting and Sustaining Self-regulated Learning"; International Journal of Educational Research, 31.

Pintrich, P.R., 2002. The Role of Met cognitive Knowledge in Learning, Teaching, and Assessing"; Theory into Practice, 41(4): 219-225.

Pintrich, P.R., 2004. A Conceptual Framework for Assessing Motivation and Self-regulated Learning in College Students"; Educational Psychology Review, 16: 380-405.

Pintrich, P.R. and E.V. De Groo, 1990. Motivational and Self-regulated learning comp- onents of classroom academic performance. Journal of Educational Psychology, 82: 33-40.

Pintrich, P.R. and E.V. De Groo, 1990. Motivational and Self-regulated learning comp- onents of classroom academic performance. Journal of Educational Psychology, 82.

Rasouli, F., 2010. Examine the relationship between metacognition, achievement goals and study strategies on academic achievement. Master's Thesis in Educational Psychology. Teacher Training University of Tehran.

Samadi, M., 2008. The effect of immediate and continuing education on self-regulation functions and mathematical problem solving. Journal of Psychology and Education Department of Tehran University, 157-175.

Schunk, D., 2001. Social–cognitive Theory and Self-regulated Learning; In B. Zimmerman and D. Schunk (Eds.); Self-regulated Learning and Academic Achievement: Theoretical Perspectives; 2nd ed. Mahwah, NJ: Lawrence Erlbaum, 125-151.

Seif, A., A. Rezaiee, 2007. Learning and study methods. Eighth Edition. Tehran. Agah Publishing Institute.

Zimmerman, B.J., M. Martinez-pons, 1998. Construct validation of a strategy model of student self-regulated learning. Journal of educational.

Zimmerman, B.J., 1990. Self-regulated learning and academic learning and achievement: The emergence of a social cognitive perspective. Educational psychology review, 2: 307-323.