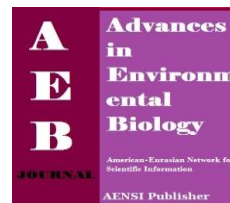




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# The Effect of Teaching How to use the Self-Regulation Strategies for Teaching Mathematics on Orientation Toward Mathematical Performance and Authority of the Female Students

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### ABSTRACT

The present study aims at studying the efficiency of self-regulation strategic components for mathematics on orientation of mathematical performance and authority in female students of Gharchak town in 2013-2014. The research method is semi-experimental with pre-test and post-test design with the control group. Population of the study include all the female students of Gharchak including 4583 students from among which 54 of them have been selected with random sampling method and divided into two groups of control and experiment. After administrating pre-test of mathematical performance and orientation questionnaire of authority for both groups, the experiment group received 10 sessions of self-regulation training for math. The control group did not receive any intervention. Data were analyzed at descriptive level (standard deviation and mean) and deductive level using ANOVA and Chi-square. Findings of the study showed that teaching the strategic components of self-regulation is effective on mathematical authority and performance. Results of the study showed that teaching strategies for self-regulation can improve the authority in students and their mathematical performance.

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## INTRODUCTION

Today, studies show that students by choosing goals take the measures to achieve those goals and try, but merely trying is not enough to act strategically [8]. Accepting the consequences of achievement goals has been studied in various fields.

One of the main areas that development goals are associated with is the self-regulated learning strategies. Pintrich [12] stated that using this strategy is an important aspect of learning and academic performance of students. Using strategies for choosing targets needs to be guided by the overarching requirement for facilities, resources and processes to achieve the goals.

Goal orientation or achievement objectives are equivalent to goals and semantic that a person considers as his progressive behavior which has been described as a motivational variable which can explain individual goals when faced with a task to learn.

The concept of goal orientation research was raised during the eighties in the study of Dweck and colleagues among a group of school children. They concluded that their study dealing with activities, children have two main objectives, one of its capabilities and its ability to demonstrate that the adoption of each of these goals in the face of challenges profound impact on the behavior and practice is.

In fact the achievement goals are a collection of behavioral intentions which determine the idea of a person about learning activities [3]. One of the most common divisions of the researchers about the achievement goals is based on two types: learning orientation and performance orientation [3] which makes the feeling and emotion of a person meaningful. In learning orientation or authority orientation which depend on individual attempts, self-learning is valuable. They try hard to learn new skills and increase their personal abilities without receiving any award and external incentive and they have internal motivation. Students with learning orientation try to increase the dominance on new subjects and emphasize understanding the issue. The first goal of these learners is to obtain knowledge and improve their skills. They have a positive understanding of themselves; they

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are responsible and have more satisfaction [11]. They believe that intelligence and ability is flexible and can be improved. So they focus on increasing knowledge and abilities and consider their defeats due to insufficient attempts and using improper strategies [3]. Furthermore, they focus on learning and select challenging activities and try hard to increase their performance and cognition.

Goal orientation theory is based on meaning and concept of motivation is social-cognitive theory and goal theory. Eliot [5] describes the goal orientation theory based on a comprehensive combination of beliefs, evidences and emotions which orient the person and includes different methods of involvement, responding and advance in different conditions. Goal theory emphasizes on how people think about their tasks and performance. Dweck and Sarich believed that goal orientation determines the relationship between students believes about success and involvement in doing a task.

Psychologists and experts in teaching and training have studied the effect of advancement goals and motivational factors in learning and performance of the students in different areas. Pintrich [11] provides a relatively comprehensive definition about self-regulation. He calls this type of learning as an active process through which the learners select some goals for themselves and then try to regulate their cognition and control it. Self-regulation includes four components of: cognitive, metacognitive, and motivational and source management strategies.

Generally speaking, self-regulation is referred to personal control on cognitive processes (thinking, memory and others). The goal of development is removing the external control and does self-control. Self-regulation is suggested by social-cognitive scholars such as Bandura. The common point of different views is the high coverage of the views with each other [14].

The expression of self-regulation strategy refers to many types of conscious behaviors which learners select in order to achieve learning and most important of them include cognitive (surface and deep), metacognitive and source management strategies. Various models have been suggested to determine the relationship between self-regulation and advancement goals. A person has emotions such as interest, tiredness, joy, hope and fear during learning a task which create feelings such as knowing, hardness, self-confidence and satisfaction and a combination of these factors are called metacognitive emotions.

These emotions create learning or avoidance behaviors and help decision making of learning condition.

Mathew [10] states that the students must pay attention to learn how to communicate complex interplay among the factors associated with self-regulated learning strategies by teachers in the areas of cognitive and learning environments. In this model, the relationship between the activity regulated learning strategies and cognitive factors in student including recourse to mathematics at school Self-efficacy beliefs in academic values and sense of fun are emphasized.

Anderson and Bratten in their study indicated that teachers need instructions to use the self-regulation strategies to improve their teaching and success for students.

So, many researches have been done during the recent years about the relationship between the advancement goals and self-regulation strategy all over the world but most of the studies deal with the correlations. The aim of the present study is to investigate the efficiency of teaching self-regulation on authority orientation in mathematics.

#### *Literature Review:*

Since 1980s, many studies have been done in the field of interaction between advancement goals and self-regulation. Vigert in his study suggested a model including the components of advancement goals (authority, performance orientation, performance avoidance), metacognitive (metacognitive knowledge, regulation and experiences), studying strategies (metacognitive, deep cognition, level cognition and resource management) and educational advancement. The model was tested and it was concluded that authority has a strong positive effect on metacognition and performance avoidance has a negative meaning on metacognition. Resource management strategies and metacognitive strategies have positive effect on score. In addition, despite the results given in literature, authority goals have positive effect on deep cognitive strategies. Furthermore, deep cognitive strategies are related to exam scores and using level cognitive strategies has negative weak effect on exam score.

The study of Cutinho [2] has shown that advancement goal is related to educational performance only through metacognitive. So, it is predicted that students with learning goals are more interested to learning and so, they have better metacognition and are better learners which it leads to better performance.

Lrista Muis in his study dealt with the relationship between self-regulation and solving mathematical problems. 264 students in Math and statistics participated in this study and completed a questionnaire about learning strategies. A number of students participated in classes of solving problems and received some teaching about meaningful and experimental reasoning.

Students who received these teachings performed more significantly and were different from other students.

Study of Vigert and Yourt showed that students who try to obtain skills in a task and learning is more important than score for them are more involved in metacognitive tasks and are aware of their reasoning based on tasks.

In addition, they know how to modify themselves and activate to have better results. One the other hand people with strong metacognition use level, deep, metacognitive and source management more but only the source management and metacognitive strategies have positive effect on scores.

Coutinho and Newman [2], in their model studied the effects of meta-cognitive components of achievement goals, study strategies, and the continued efficacy. The results indicated a positive relationship between learning orientation and metacognitive in many cases.

Estavinpolous, in his study found that the achievement goals of deep and surface learning strategies and metacognition are linked. Using orientation with deep learning strategies is the sign of monitoring and constructive views of learning.

Theodosiv and Papoyanov, in their study found that there is a positive relationship between orientation to learning and metacognitive strategies. People with a learning orientation, are involved in the task of trying to acquire new skills, strategies and use more in-depth understanding tasks such as monitoring and linking new information to prior knowledge.

Study of Burden and Midgley, was about the achievement goals, cognitive and academic performance and indicated that learners have higher mastery orientation, shape and organization of cognitive elaboration use and thus affect the academic performance of students.

Green Miller used path analysis and examined relationships between variables, perceived ability, performance goals, mastery goals, strategies, superficial and deep processing strategies and academic achievement. Mastery goals directly affect the deep processing strategies. The deep and shallow processing strategies affect academic achievement.

Foulad Chang in their study showed that girls tended to have more dominate orientation than boys. It also showed that boys tend to judge other positive and proven competence more than girls do.

In recent years the effectiveness of self-regulated learning strategies on characteristics of the areas of significant achievement goals has been evaluated. To explain, researchers and theorists have proposed various models. The aim of this study was to answer the question that if self-regulated learning strategies affects the component orientation to dominate the practice of effective learning math?

Objective: To determine the effectiveness of self-regulated learning strategies component orientation on dominate the mathematics performance of students in mathematics education.

#### *Hypothesis:*

1. Teaching component of self-regulation strategies for mathematics affects students' mastery orientation disposition.
2. Learning component of self-regulation strategies for mathematics affects students' math performance.

#### *Methodology:*

The present study aims at studying the efficiency of self-regulation strategic components for mathematics on orientation of mathematical performance and authority in female students of Gharchak town in 2013-2014. The research method is semi-experimental with pre-test and post-test design with the control group. Population of the study include all the female students of Gharchak including 4583 students from among which 54 of them have been selected with random sampling method and divided into two groups of control and experiment.

After administrating pre-test of mathematical performance and orientation questionnaire of authority for both groups, the experiment group received 10 sessions of self-regulation training for math. The control group did not receive any intervention.

**Table 1:** Demographic features of experiment and control group.

Volume	Error mean Iq	Standard deviation of Iq	Mean Iq	Group
27	1/98	11/35	109/79	Test
27	1/79	10/93	110/05	control

1. As it is seen in Table 1, both groups' mean and standard deviation of IQ is very close and there is no significant difference between the two groups in terms of IQ.

The study design and methods: in the present research causal relationships of the variables of regulated learning strategies and orientations to dominate were studied in terms of a model based on the urethane model suggested in 2008. The participants were divided in to experimental and control groups. The study was conducted in three stages of quasi-experimental, pretest - posttest. Students in the experimental group were taught self-regulated learning strategies during 10 one-hour sessions.

*Data collection instruments:*

Goal orientation questionnaire was used to the measure variables. The 10-item Vandvall goal orientation questionnaire (1997), based on Likert scale ranging from completely agree (scored 7) to strongly disagree (scored 1) was used. Reliability of the questionnaire in this study was 0/82.

2. Mathematical function tests: pre-test and post-test developed by the researchers was used as tools to measure mathematical performance. To test the validity of the method ideas of four math teachers (average experience of 15 years teaching mathematics) teaching high school of design, evaluation, and judgment were used and confirmed. To evaluate the reliability, both tests were carried out (14 questions) on the 26 students out of the samples. The statistics in question showed that eliminating any question pretest level of reliability in the range of 0/81 to 0/83 changes. In addition, the reliability of the tests made two questions to be eliminated. The reliability of the remaining 12 questions on was a range of 0/74 to 0/79. The alpha coefficient was equal to 0/79 and indicated the internal consistency of the test.

*Results:*

After reviewing the default assumption of normally distributed variables of dominate orientation (Table 2) by Kolmogorov - Smirnov (KS), Levene test was used to evaluate the consistency of variance (Table 3) and at the end in order to test the hypothesis and study the average differences, one-way ANOVA and post hoc chi-square test (HSD) were used.

**Table 2:** Normality of distribution.

Post-test		Pre-test		Group	
Control	Test	Control	Test	Z amount	Authority orientation
0/496	0/409	1/170	0/627	Significance level	
0/967	0/996	0/129	0/827	Z amount	Mathematical performance
0/548	0/679	1/037	0/927	Significance level	
0/925	0/745	0/233	0/357		

Results of table 2 show the values obtained for both variables z and significant research about the four tests, all values were higher than 0/05 and this indicates that the null hypothesis is accepted and the variable distribution normal distribution for research's.

**Table 3:** Statistical indices of experiment and control group.

SD		Mean		group	Variables
Post-test	Pre-test	Post-test	Pre-test	Test	Authority orientation
2/755	3/002	23/85	20/63	Control	
3/192	3/179	20/96	20/48	Test	Mathematical performance
2/3644	3/0782	15/426	13/074	Control	
3/0062	3/1414	13/537	13/185		

Results of table 3 indicated that mathematical performance and self-regulation are significantly different in terms of mean, standard deviation in posttest.

**H1:** teaching self-regulation strategies for mathematics affects the authority orientation of the learners. Leven's test was performed to test the hypothesis.

**Table 4:** ANOVA analysis of authority.

(Sig) Significance level	F maximum	In-group freedom	Intergroup freedom
0/876	0/229	104	3

It is seen that  $p > 0.05$  and there is no significant difference in terms of variance. So variances are correlated. Then the data do not question the hypothesis.

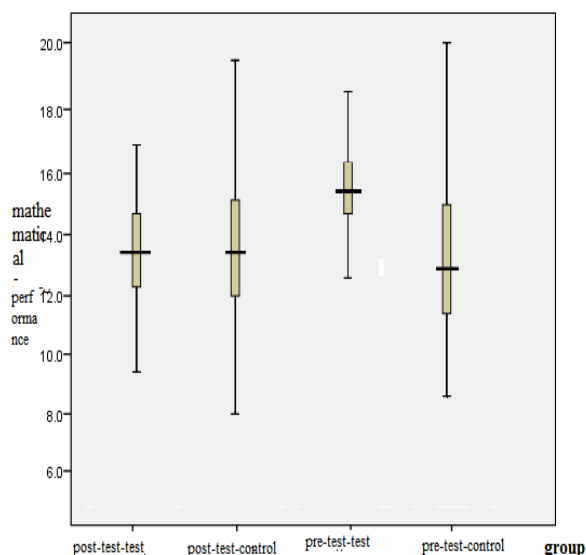
According to figure 1 and 2 both variables of authority and mathematical performance are less in posttest and this shows the reduction of score variances. In addition, the chart indicates the increase in score and mean line in the posttest.

Levine's test was performed to test the authority orientation and results are shown in table 5.

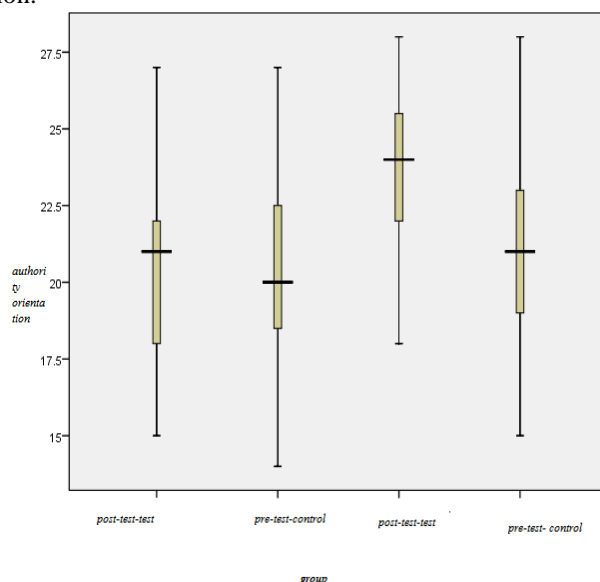
**Table 5:** ANOVA for authority.

(Sig) Significance level	F maximum	In-group freedom	Intergroup freedom
0/876	0/229	104	3

It is seen that  $p > 0.05$  and there is no significant difference in terms of variance. So variances are correlated. Then the data do not question the hypothesis.



**Fig. 1:** Authority orientation.



**Fig. 2:** Mathematical performance.

**Table 6:** ANOVA for authority.

Significance level	F amount	Mean squares	Freedom degree	Squares sum	
0/000	7/427	68/519	3	205/556	Intergroup
		9/225	104	959/407	In-group
			107	1164/963	Total

It is seen that  $p > 0.05$  and there is no significant difference in terms of variance. So variances are correlated. Then the data do not question the hypothesis.

**Table 7:** Chi-square for authority.

Confidence interval 95%		Sig.	SD	Mean difference	Group (2)	group (1)
Top end	Low end					
5/38	1/06	0/001	0/827	3/222*	Pre-test-test	pre-test- test
5/53	1/21	0/001	0/827	3/370*	Pre-test-control	
5/05	0/73	0/004	0/827	2/889*	Post-test-control	

Results of chi-square indicated that in paired comparison of four tests, posttest mean for experiment group is significant at  $p > 0.05$  and so there is a meaningful difference.

H2: teaching the self-regulation strategies for mathematics affects the performance of the learners.

**Table 8:** Variance for mathematical performance.

Sig.	F maximum	In-group freedom	Intergroup freedom	Variable
0/460	0/868	104	3	Mathematical performance

It is seen that  $p > 0.05$  and there is no significant difference in terms of variance. So variances are correlated. Then the data do not question the hypothesis.

**Table 9:** ANOVA test for mathematical performance.

Sig.	F amount	Mean squares	Freedom degree	Squares sum	
0/012	3/834	32/559	3	97/676	Intergroup
		8/493	104	883/241	In-group
			107	980/917	Total

Results of ANOVA indicates that F is bigger than critical amount and significance level is  $p < 0.05$  and so there is a significance difference between mathematical performance and mean scores.

**Table 10:** chi square of mathematical performance.

Confidence interval 95%		Sig.	SD	Mean difference	Group (2)	group (1)
Top end	Low end					
4/423	0/281	0/019	0/7932	2/3519*	Pre-test-test	pre-test- test
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-control	

Based on table 10, the results of chi-square about mathematical performance indicated that in paired comparison, experimental groups' posttest is higher than others in mean and level of significance is  $p < 0.05$ . So, mean difference of posttest of experimental group is significant.

## RESULTS AND DISCUSSION

Findings of the present study are presented in tables 5 and 6 and indicated that using the self-regulation strategies are significantly related with the authority orientation in female students. Therefore, teaching these strategies has been effective and research hypothesis is accepted. Results of the present study are in line with the study of Cutinho [2], Christa Myes, Vigret and Yourt, Cutinho and Newman, Staveriabpolus, Theodosio and Papionove, Yourden and Midgoly, Chi hang [1], Greenmiller, Karshaki [8], Fouladchnag, Khormaiee and Kheir, Ghadampour and Sarmad. So, it is considered that the students with any goal have authority orientation and become aware of them with learning strategies and recognize their abilities and plan and supervise their learning. So, it can be found that learning process is not fixed and it is an improving process which can be better through practicing and students learn how to improve their skills in order to be successful. There is no doubt that academic performance is so important that students think about how to succeed. In case of not being successful, they try to compensate and obtain knowledge and have better educational performance.

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