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The Relationship of Cognitive and Metacognitive Strategies with Motivation for Academic Achievement

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Abstract: The purpose of the study was to determine the relationship of cognitive and metacognitive strategies with motivation for academic achievement of female high school students (region 13, Tehran, 2013-2014). Population included all female high school students. Sample consisted of 300 students selected by multistage random sampling. Two instruments were used: Hermans' questionnaire for achievement motivation with 29 multiple-choice unfinished sentences including 10 components (ambition, risk taking behavior, upward mobility, resistance, task stress, time perception, time perspective, choosing friend with partner, ethology, behavior of achievement) as well as the of Karami learning strategies questionnaire with 86 items, 49 on cognitive strategies and 37 on metacognitive strategies were used for the collection of the required data. Pearson correlation test was used to analyze the data.

Key words: Learning strategies, cognitive strategies, metacognitive strategies, achievement motivation, ambition

INTRODUCTION

Unlike the past that it was thought any individual's ability to learn is a function of their intelligence and talents in recent years this theory has been developed among trainers and psychologists that despite the crucial role of innate factors, intelligence and talent in strategies" or the more technical term "cognitive and metacognitive strategies" are one of learning non-intrinsic factors considered important in this regard as well. "Learning the factors that psychology and educational sciences have been widely developed in the last few years. The purpose of education is to improve student learning. Learning is not a single subject but almost all of the activities done during the life time originate from the learning experiences. Two types of learning strategies, cognitive and metacognitive strategy have been generally emphasized. Educational psychologists and education experts have been trying for years to answer the question of why some students were successful compared to others in terms of academic achievement? To answer this question, it is essential to review the factors thought to determine academic success. The use of cognitive strategies was the only issue considered by educational psychologists but gradually it has become clear that the key to explain and predict success is not only the use of cognitive strategies. Many students using cognitive strategies have lots of difficulties in learning the lesson while other students with a greater emphasis on metacognitive strategies have earned a higher academic success. Cognitive strategies used to process the information are summarized in three categories:

- Repeating or reviewing simple and complex assignments
- Expanding simple and complex tasks
- Organizing simple and complex assignments (King, 1991)

In comparison with cognitive strategies which are ways of learning, metacognitive strategies are the explanations to monitor and lead cognitive strategies. Dembo to compare the two strategies together said, "according to news processing, cognitive strategies help us to link fresh information with our previous information and prepare them to be stored in long-term memory. Cognitive strategies are necessary tools to learn content but metacognitive strategies have effects on cognitive strategies and direct them. In other words, the learners can be given cognitive strategies and more training; however, it is metacognitive skills that say what strategy or cognitive strategies to be used in a specific situation and when to change the strategy. Therefore, cognitive and metacognitive strategies should work together. According to the most recent theories of learning, quality of learning depends on the ability of learners to guide

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and direct learning to develop the skills of questioning, learning and thinking and to monitor their learning processes. Among these, metacognitive skills are key concepts. The term "metacognition" was introduced in the field of cognitive psychology for the first time in 1976 by Flavell (1987) who defined the term as any knowledge or cognitive acts whose subject is the cognitive activities and adjusting them. In the field of psychology, metacognition involves two basic dimensions: metacognitive knowledge and self-controlling skills. According to Flavell (1987), the first dimension includes knowledge and their own beliefs about the factors and variables that interact with each other in the cognitive process. The factors or variables include: knowledge about their own abilities and the features of the task and cognitive strategies. The second dimension is knowledge adjustment referring to the cognitive process that coordinates knowledge. This dimension includes metacognitive skills and plays an important role in a variety of cognitive learning activities, time, perception, attention, memory, problem solving, social structure, various forms of self-education and self-controlling (Flavell, 1987). These skills include planning, organization, information management, evaluation, debugging. With regard to what were mentioned, the main question of the research is whether or not there is a relationship between increasing the level of cognitive and metacognitive skills of students and their academic achievement.

Research objectives (The overall objective)
Specific objectives:

- Studying the relationship between cognitive strategies in motivation of academic achievement
- Studying the relationship between metacognitive strategies in motivation of academic achievement

Research hypotheses:

- H_1: there is a relationship between the use of cognitive strategies (repetition and review, semantic develop, organization) and students' motivation of academic achievement
- H_2: there is a relationship between the use of metacognitive strategies (planning, monitoring and evaluation, regulation) and students' motivation of academic achievement
- H_3: there is a relationship between learning strategies and students' motivation on academic achievement

MATERIALS AND METHODS

This study was correlational because the researcher was going to measure the relationship between the variables and to determine the correlation between the variables and the contribution of each of the sub-scales in the variable of criterion.

Population: All girl students in high school (region 13, Tehran City) in school year of 2013-2014.

Research tools: Statistical techniques were used to analyze the data obtained through implementing the questionnaires. In addition to the use of descriptive statistics (frequency, mean, standard deviation), the inferential statistics of Pearson correlation test was used to test the research hypotheses.

RESULTS AND DISCUSSION

First hypothesis: There is a relationship between the use of cognitive strategies (repetition and review, semantic development, organizing) and students' motivation of academic achievement.

In order to explain and also investigate the role of "cognitive strategies" as the predictive of motivation of students' achievement as a criterion variable, the research data were put into regression equation and the results are shown in the Table 1-3.

As it can be seen in Table 1, cognitive strategies had 0.151 of correlation coefficient with motivation of students' academic achievement and alone explain 0.23% of the variance of the achievement motivation.

According to the information in Table 2, the role of cognitive strategies is significant ($p<0.048$) in explaining the motivation of students' achievement.

The analysis results as well as the value of beta in the Table 2 indicate that there is a positive and significant correlation ($p<0.005$) between the use of cognitive strategies and students' achievement motivation. Also, according to standard coefficient of regression separation (β) in Table 3, it can be concluded that the components of semantic development and organizing have stronger and more effects on the motivation of students' achievement in compared to the component of repetition and review. And based on the above evidence, the first hypothesis is confirmed.

Second hypothesis: There is a relationship between the use of metacognitive strategies (planning, monitoring and evaluation, regulation) and students' motivation of academic achievement.

Table 1: Regression analysis of cognitive strategies and motivation of students' academic achievement

Correlation coefficient (R)	The square of the correlation coefficient (R^2)	Modified coefficient	Standard error of estimate
0.151	0.23	0.13	14.74

Table 2: Regression analysis

Sources of changes	Total of squares	Degrees of freedom	Mean of squares	F-value	Significance level
Regression	1495.679	3	498.560	2.295	0.048
Residuals (errors)	64315.238	296	217.281	-	-
Total	68810.917	299	-	-	-

Table 3: Variables entered into the regression equation

Components of the index	Standard coefficient (β)	Standard error	Non-standard coefficient (B)	Significance level	t-values
Fixed number	-	5.677	88.849	0.000	15.650
Repetition and review	0.158	0.101	0.099	0.329	0.978
semantic development	0.171	0.158	0.341	0.032	2.160
Organizing	0.387	0.127	0.275	0.031	2.168

Table 4: Regression analysis between metacognitive strategies and motivation of students' academic achievement

Correlation coefficient (R)	The square of the correlation coefficient (R^2)	Modified coefficient	Standard error of estimate
14.451	0.25	0.35	0.186

In order to explain and also investigate the role of "metacognitive strategies" as the predictive of motivation of students' achievement as a criterion variable, the research data were put into regression equation and the results are shown in Table 4-6.

As it can be seen in Table 4, metacognitive strategies had 0.186 of correlation coefficient with motivation of students' academic achievement and alone explain 0.35% of the variance of the achievement motivation.

According to the information in Table 5, the role of metacognitive strategies is significant ($p<0.015$) in explaining the motivation of students' achievement.

The analysis results as well as the value of beta in Table 5 indicate that there is a positive and significant correlation ($p<0.005$) between the use of metacognitive strategies and students' achievement motivation. Also, according to standard coefficient of regression separation β) in Table 6, it can be concluded that the components of monitoring and evaluation have stronger and more effects on the motivation of students' achievement in compared to the component of planning. And based on the above evidence, the second hypothesis is confirmed.

Third hypothesis: There is a relationship between learning strategies and students' motivation of academic achievement.

As it can be seen in Table 7, Pearson correlation coefficient is 0.130 and significance level is 0.015 and since it is <0.05 with 95% certainty it can be said that there is a positive and significant relationship between learning strategies and girl students' motivation of academic achievement. Therefore, the third hypothesis generally confirmed.

Investigating the first hypothesis: According to the first hypothesis confirmed, there is a relationship between the use of cognitive strategies (repetition and review, semantic development, organizing) and students' motivation of academic achievement. Based on the evidence and information in Table 2 and 3 it can be concluded that cognitive strategies have a 0.151% of correlation coefficient students' motivation of academic achievement and explain only 0.23% of the variance of their motivation of academic achievement. Among the components of cognitive strategies, the semantic development and organizing components have stronger and more effects on girl students' motivation of academic achievement and based on the above evidence, the first hypothesis is confirmed. The study conducted by Anderman and Young (1994) indicated that there is a positive and significant relationship among each of learning strategies including mental review, developing, organizing and monitoring students' understanding. Ababaf in a study concluded that more clever students use the cognitive strategies of organizing, developing, repeating and practicing and metacognitive strategy of monitoring students' understanding more than weak students.

Investigating the second hypothesis: According to the second hypothesis confirmed, there is a relationship between the use of metacognitive strategies (planning, monitoring and evaluation, regulation) and students' motivation of academic achievement. Based on the evidence and information in Table 4 and 5 it can be concluded that metacognitive strategies have a 0.186% of correlation coefficient students' motivation of academic achievement and explain only 0.35% of the variance of their motivation of academic achievement. Among the components of metacognitive strategies, the monitoring and evaluation, regulation components have stronger and more effects on girl students' motivation of academic achievement and based on the above evidence, the second hypothesis is confirmed previous studies indicated that there is a significant relationship between metacognitive strategies and students' motivation of academic achievement. AtarKhameneh in a

Table 5: Regression analysis

Sources of changes	Total of squares	Degrees of freedom	Mean of squares	F-value	Significance level
Regression	73.926	3	757.957	3.531	0.015
Residuals (errors)	63536.991	296	214.625	-	-
Total	65810.117	299	-	-	-

Table 6: Variables entered into the regression equation

Components of the index	Standard coefficient (β)	Standard error	Non-standard coefficient (B)	Significance level	t-values
Fixed number	-	5.572	81.524	0.000	14.632
Repetition and review	0.023	0.108	0.022	0.840	0.202
semantic development	0.173	0.088	0.176	0.046	2.003
Organizing	0.209	0.193	0.448	0.021	2.316

Table 7: Pearson correlation coefficient of the relationship between learning strategies and students' motivation of academic achievement

Variables	Number of	Pearson correlation coefficient	Significance level
Learning strategies achievement motivation	300	0.13	0.015

study indicated that teaching metacognitive, studying and learning strategies were effective on girl students' motivation of academic achievement. In the study conducted by Ashari *et al.* (2010), it was confirmed that self-regulated learning strategies were effective on the performance of pre-university students. Malekian *et al.* (2012) in a study concluded that among metacognitive strategies, the strategies of planning, controlling and monitoring had the most effects on the students' motivation of academic achievement. Derossis *et al.* (2004) in a study confirmed that there was a relationship between the motivation of achievement, studying skills, performance and academic achievement. Live and Chen showed that there was also a significant relationship between the strategies of studying and students' motivation. Fazal *et al.* (2012) in different studies concluded that there was a significant relationship between taking notes with academic achievement. Nonis and Hudson (2010) indicated that studying skills, note-taking, especially paying attention in class and study before class were useful in academic success.

Investigating the third hypothesis: According to the third hypothesis confirmed, there is a relationship between learning strategies and students' motivation of academic achievement. In other words, the data of the study indicated that there is a positive and significant correlation between learning strategies and students' motivation of academic achievement. Therefore, it should be stated the more people know and use learning strategies the more motivation of academic achievement they have.

The findings of this study can be explained in such a way that there is a significant correlation between teaching cognitive and metacognitive strategies and girl students' motivation of academic achievement. These findings are consistent with previous research findings (Khameneh and Seif, 2009; Malekian *et al.*, 2012; Cross and Paris, 1988) that confirmed there is a significant relationship between cognitive and metacognitive strategies and students' motivation of academic achievement. According to learning theories, one of the factors affecting the achievement motivation is the students' awareness from cognitive and metacognitive strategies and students' independence from teachers, parents and educational resources. Selecting proper cognitive and metacognitive strategies is to meet the goals. It seems that students at schools when studying their lessons can perform overall analysis of text and use other supporting resources such as teachers and parents. But, it seems that when lessens become difficult they cannot find a proper strategy to solve their problems.

Several studies in learning and educational psychology showed that there is a relationship between motivation and school learning especially learning strategies because learning is an active process that requires deliberate and conscious efforts. If a student with high ability does not have enough attention or concentration when to study and learn or does not demonstrate effective efforts will notbe able to learn. To make students take maximum benefit from the curriculum, a situation should be provided in class in which the students get motivated in participating in learning activities which can lead to a situation to stimulate achievement motivation. If students are highly motivated in achievement, they will seek dominance in the learning assignments. The results of this study are consistent with the results of studies done by Fazal *et al.* (2012), Nonis and Hudson (2010), Moghadam and Cheraghian (2009), Maleki (2005) and Lavasani *et al.* (2007). Motivation to learn is often associated with foreign interests and leads to quick results, therefore as a powerful source it can make the student's finish their assignments soon. Therefore, it can be associated with students' motivation of achievement.

CONCLUSION

Result showed that there is a significant relationship between cognitive and metacognitive strategies and students' achievement motivation.

SUGGESTIONS

Based on the results of the research the practical suggestions could be stated:

- Familiarizing students with learning strategies through preparing and developing simple and intuitive scientific booklets can help them in this regard
- Holding workshops to familiarize students with cognitive and metacognitive strategies at schools to enhance these skills to make achievement motivation
- The results of the study revealed that cognitive and metacognitive strategies have effects on the creativity of girl students and increase it, therefore, they have a direct impact on improving motivation. In this regard, the school consultants are recommended to improve students'achievement motivation level through using cognitive and metacognitive strategies

Following research topics are recommended:

- Conducting the same study with boy students of high school to compare the results
- Studying all factors affecting achievement motivation
- Studying the relationship between cognitive and metacognitive strategies with creativity and problem-solving
- Studying the relationship between cognitive and metacognitive strategies with abstract thinking
- Studying this topic in other cities and compare it with the results because similar studies are needed to be conducted

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