



## The Role of Cognitive predictors in academic achievement of high school students in Salmas

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**ABSTRACT:** The study aimed to investigate the role of Cognitive predictors in academic achievement of high school students in Salmas. The multi-stage cluster sampling method is used for the study, 285 (male and female) participants were selected as sample. They responded to LaGuardia, Ryan, Couchman, and Deci's basic psychological needs Inventory (2000), Ruchi, Valerand, Deci, and Ryan's academic motivation scale (AMS) (2013), and Peltier, Pintrich, and colleagues' learning strategies questionnaire (1991). The data were analyzed using SPSS version 18 software. The structural equation modeling was used to study the relationship between variables. The results showed that there is no relationship between cognitive strategies and academic achievement and result showed it was confirmed meta-cognitive (planning, monitoring, regulation) strategies and academic achievement.

**Keywords:** cognitive strategies, metacognitive strategies, academic achievement

### INTRODUCTION

The academic achievement has great importance. Now a days, the students' academic achievement is considered as an important indicator in the assessment of educational systems. In addition, the real academic achievement is also important for teachers, students, parents, and educational theorists and researchers.

The academic achievement is the learned or acquired abilities from lessons or academic issues which are measured by standardized tests (Atkinson et al. (1988), quoted by Seif (2005)).

Detecting the cognitive and motivational predictors and their components in academic achievement, there will be unity in teaching process and the mental health of students will be protected against not having teaching and evaluation planning.

The application of psychological principles to enhance the education quality is a scientific method, because the proper and high quality education will not be possible for both students and teachers by overlooking individual differences and individuals' conditions and characteristics.

All of the psychology, psychotherapy, and behavior modification theories are rooted in motivation, cognitive strategies, metacognitive strategies, motivational orientation, self-management, self-efficacy, self-monitoring, self-determination (humanists), correct data processing, information processing, teaching in the form of Tyler stages before, during, and after teaching (Rio and Marshall, 2007).

The learning and study (cognitive and metacognitive) strategies, suitable study methods and strategies, learning method, suitable use of learning processes, and achievement of learners at different ages and educational levels are included in the curriculum (Kadivar, 2004). Rahmani (2001) found that the cognitive strategies predict significantly and positively the achievement of students. Considering the importance of meta-cognition and meta-cognitive skills among students, Slavin (1994) argued that in the past decades, the educational psychologists have emphasized on teaching the special learning strategies (Kadivar, 2004). Lefrancouise (1997) emphasized that the most important issue of cognitive psychology in educational psychology is the emphasis on learning (how to learn) as a general purpose of learning and teaching process (Kadivar, 2004). The ignorance of cognitive and meta-cognitive strategies, basic psychological needs, and motivation in educational system may impact on all educational levels. The cognitive strategies are learning strategies, while the metacognitive strategies monitor and direct cognitive strategies. The major cognitive strategies can be put into three categories: planning, supervision, and regulation (Wool Folk, 2001). The researchers consider development as the most important and effective cognitive strategy, since this cognitive strategy links the previous information to new information; as a result, knowledge becomes richer (Winstin and Mayer, 1989).

Although it is useful compared to repeat and review strategy, essentially it is boring. The organization is another cognitive strategy in which the learner classifies the information semantically, because the learning and remembering of well organized material is easy (Durso and Coggins, 1991). Rahmani (2001) found that the cognitive strategies predict significantly and positively the achievement of students. In a meta-analysis on the factors affecting student learning, Wang *et al.* (Quoted by Mostafaei, 2006) showed that among 228 factors affecting learning, the cognitive and metacognitive processes have the greatest impact on student learning. In general, the teaching of metacognitive strategies provides the situation for individuals' academic involvement, internal locus of control, positive attributions, greater motivation, creativity, productivity, and self-responsibility, reinforces self-confidence in life, and enables people to identify problems, try activities, act independently, and provide the best solutions in different affairs (Mostafaei & Mahboobi, 2007). Kadivar (2004) defined metacognition as the knowledge of individuals of their own cognitive system and its control and believed that metacognition is cognition beyond ordinary thinking and understanding. In a study, Karami (2002) concluded that the impact of motivational factors on the use of cognitive and metacognitive strategies is studied in the learning process. Due to the fact that not only learning and study (cognitive and metacognitive strategies) skills are very effective in learning and academic achievement, but also these skills can be taught by teachers and students, it is essential to teach learning and study (cognitive and metacognitive) strategies; therefore, students will learn more about what is necessary for active learning, monitor the learning process, get the necessary motivation to continue learning, and achieve higher academic success. This study aims to answer the questions in this respect: How the cognitive and meta-cognitive strategies affect academic achievement?

#### *Research Objectives*

General objective: Investigating the structural relationship between predictors cognitive (cognitive and meta-cognitive strategies) predictors and student achievement.

Sub-objectives: - Determining the relationship between cognitive strategies and academic achievement.

- Determining the relationship between meta-cognitive strategies and academic achievement.

- Determining the structural relationship model of cognitive (cognitive and meta-cognitive strategies) predictors in students' academic achievement.

*Research Hypotheses:* 1. There is a positive and direct relationship between cognitive strategies and academic achievement.

2. There is a positive and direct relationship between meta-cognitive strategies and academic achievement.

Research background: Motavali (1997) concluded that there is relationship between the use of metacognitive strategies and reading, comprehension, and learning rate. Ebrahimi Ghavam Abadi 1998(1377) concluded that there is positive relationship between teaching these strategies and comprehension and learning rate, positive self-concept, planning, and problem-solving ability of individuals.

Avanesian (1998) showed that there is relationship between teaching metacognitive strategies and comprehension and learning rate of students.

In a study on seventh grade students' lessons, Degourt, EL (2001) found that there is positive correlation between meta-cognition and students performance.

In order to process information correctly, the learner must be aware of its own capabilities (Carr, M., Joyce, A, 1998).

In a study entitled educational effectiveness of cognitive strategies in academic achievement of students in fourth and fifth grade elementary schools in Tehran, Manouchehri Arestani (2011) showed that their cognitive and teaching strategies affect students' academic achievement.

In a research on the effect of cognitive strategies in academic achievement of students with dysgraphia), Niazzi et al. (2008) concluded that the teaching of cognitive strategies is effective in relief of disorder, there is a significant difference between experimental group and control group, and the experimental group has significantly better academic performance than the control group. In a study entitled (The impact of meta-cognitive skills on problem solving), Kay, L (1992) showed that meta-cognitive skills play an important role in solving the problem. Bieler and Snowman (1993) reported a research in which Paris and colleagues taught cognitive and metacognitive skills to third and fifth grade students in 1984 and 1986. The results showed that students who were taught these skills (experimental group) had better performance in comprehension and reading skills compared to students who were deprived of these skills (control group). In a study entitled (The impact of cognitive and metacognitive strategies on increase of learning and retention of different textbooks), Maleki (2005) showed that the teaching of cognitive and metacognitive strategies enhance significantly the learning and retention of learners.

ErfaniAdaab, Mesrabadi, and Zavvar (2013) showed that the use of cognitive and metacognitive strategies enhance effectively the comprehension and retention of textbooks.

In a study entitled (The relationship between cognitive and metacognitive strategies and academic success of students in urban and rural secondary schools), Parviz and Sharifi (2011) showed that there is significant and positive relationship between the use of cognitive and metacognitive strategies and obtained average; the urban students used both strategies more than rural students. In a study (The relationship between meta-cognitive experience of parents and students and students' academic progress), Samadi (2001) suggested that the metacognitive experience of parents impacts directly on metacognitive experience of students; and the metacognitive experience of students has a direct impact on academic progress of students. Fouladchang and colleagues (2007) examined the effect of meta-cognitive processing in problem solving. They found that meta-cognition impact on problem solving is significant and people must deal with new tasks better with meta-cognitive acceptance. Weinstein and Hume (1998) believed that teachers can teach learning and study (cognitive and metacognitive strategies) skills to help students to be successful learners and play a more active role in their academic fate. In a study entitled (The efficacy of meta-cognitive teaching method in academic performance and cognitive awareness of middle school students in science course, Safari and Marzougi (2009) showed that the mean of academic achievement and metacognitive awareness in experimental group was significantly higher than control group. In a study entitled (The role of cognitive and metacognitive strategies in progress motivation of learners in information and communication technology-based educational system), Malekian (2010) reported that the role of cognitive and metacognitive strategies in progress of learners is significant. In a study entitled (The Impact of metacognitive strategies on students' academic achievement), Mahoen, D (2000) showed that metacognitive strategies significantly impact students' academic achievement and success in assignments. In a study entitled (The Impact of cognitive and metacognitive skills on student achievement), Ababaf (1996) showed that successful learners take maximum advantage of cognitive skills.

## MATERIALS AND METHODS

This was descriptive (non-experimental) and correlation study. Using structural equation modeling, the relationships between variables were discussed in causal model. The study population consisted of all high school students in Salmas in 2013-2014 (N=5338,

female= 2,726 and male= 2,612). In this study, the cluster multi-stage sampling method was used for selecting the sample. However, 12 schools were selected from a total of 23 secondary schools in Salmas; and from each school, one class was selected as sample. Totally, 300 questionnaires were distributed and collected. The Cochran formula was used to select the sample size. This formula showed that 150 participants should be selected as sample. Since it is recommended in path analysis that the sample size should at least be more than 200 people (Homan, 2008), 300 questionnaires were distributed among 100 female and 200 male students. However, fifteen questionnaires were not usable and 285 questionnaires were used in the final analysis.

Research tools:

Learning strategies questionnaire: The Pintrich et al.'s questionnaire (1991) was used to assess students' learning strategies. This questionnaire consists of 22 items with two sections: cognitive strategies (10 items) and meta-cognitive strategies (12 items). The items were set based on five-point Likert scale from absolutely disagree= 1 to absolutely agree=5. The reliability of this questionnaire in this research was reported to be 0.84.

Academic Achievement:

The students' average was used to measure the academic achievement.

## RESEARCH FINDINGS

The data were analyzed using SPSS version 18 software. The structural equation modeling was used to study the relationship between variables learning strategies, and academic achievement as endogenous variables. The Amos software version 16 was used to test the theoretical model of research.

**Testing theoretical model and research hypotheses:**

Correlation matrix of variables is explained in Table 1. According to Table 1, the direct effect of meta-cognitive strategies (0.26) and motivational orientation (0.29) in academic achievement was positive and significant at 0.001 level. However, the effect of cognitive strategies (-0.04) in this variable was not significant. Table 2 explains estimation of total effect coefficients.

According to Table 2, only the first hypothesis (the effect of cognitive strategies in academic achievement) was not confirmed.

**Table 1: Correlation matrix of variables.**

Variables	Path coefficient	t-statistics	Sig. level
Academic achievement			
Cognitive strategies	-0/04	-0/74	0/45
Meta-cognitive strategies	0/26	4/47	0/001

**Table 2: Estimation of total effect coefficients.**

No.	Hypothesis	Path coefficient	t-statistics	P	Result
1	There is a positive and direct relationship between cognitive strategies and academic achievement.	-0/04	-0/74	0/45	Rejected
2	There is a positive and direct relationship between meta-cognitive strategies and academic achievement.	0/26	4/47	0/001	Confirmed

The results did not confirm this hypothesis. They showed that there is no significant relationship between cognitive strategies and academic achievement.

Second hypothesis: there is relationship between meta-cognitive strategies (planning, monitoring, and control) and academic achievement. This finding is consistent with research results of Yagoubi (2004), Fouladchang, Kadivar, and Farzad (2007), Kai (1992), and Yousefzade and Mesrabadi (2003).

Motavali (1997) concluded that there is relationship between the use of metacognitive strategies and reading, comprehension, and learning rate. EbrahimiGhavamAbadi 1998(1377) concluded that there is positive relationship between teaching these strategies and comprehension and learning rate, positive self-concept, planning, and problem-solving ability of individuals.

Avanesian (1998) showed that there is relationship between teaching metacognitive strategies and comprehension and learning rate of students.

In a study on seventh grade students' lessons, Degourt, EL (2001) found that there is positive correlation between meta-cognition and students performance.

In order to process information correctly, the learner must be aware of its own capabilities (Carr, M., Joyce, A, 1998).

### RESEARCH SUGGESTIONS

In this study, it was assumed that if the meta-cognitive strategies are taught in schools and in dealing with students, their academic achievement will increase. Therefore, the following practical suggestions are provided to teachers, parents, education authorities, and consultants in order to increase students' academic achievement. The teachers and authorities of education and training should take it for granted that the cognitive and meta-cognitive strategies could be taught. They should hold workshops in this regard. There is positive relationship between these strategies and individuals' positive self-concept and problem-solving ability. The parents' meta-cognition impacts children's meta-cognition influential parents. This should be stated in counseling and guidance sessions of families.

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