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The Role of Cognitive and Motivational Predictors in Academic Achievement of High School Students in Salmas in 2013-2014

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ABSTRACT: Using structural equation modeling, this study aimed to investigate the role of motivational (autonomy, competence, communication) factors in using cognitive and meta-cognitive strategies for academic achievement. Using multi-stage cluster sampling method, 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, Pintriech, 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. However, the basic psychological needs explained the motivational orientation and meta-cognitive strategies of academic achievement. There was a significant and positive relationship between motivational orientation and academic achievement (0.38) at 0.001 level. Therefore, it was confirmed that there was a relationship between autonomy, competence, communication, and meta-cognitive (planning, monitoring, regulation) strategies and academic achievement.

Keywords: cognitive strategies, meta-cognitive strategies, motivational orientation, academic achievement

INTRODUCTION

As an outcome behavior, the academic achievement has great importance. Today, 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.

As the most important elements in learning, the motivation and cognition have always attracted the attention of educationalists and learning researchers (Pintriech & Degroot). According to Pintriech and Shank (2002), it is today agreed that students need cognitive skills and motivational orientation to have a good performance in school (Pintriech & Shank, 2002). 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.

In a study, Rahmani (2001) found that cognitive strategies predict the academic achievement of students significantly and positively. 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). Lefrankuis (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 (Alderman, 1383).

The ignorance of cognitive and meta-cognitive strategies, basic psychological needs, and motivation in educational system may impact on all educational levels. The cognitive ability and motivation factors have been identified as the most important determinants of academic achievement. Bloom (1956) is one of the first theorists who pointed to the role of motivation in school learning. In general, the academic motivation is the motivations, needs, and factors which guarantee an individual's presence in the education environments (Clark & Shrot, 2010). In a full analysis of motivation process, three important structures should be taken into account: intrinsic motivation, extrinsic motivation, and lack of motivation (Vallerand, Pliter, and Bliss, 2010).

The intrinsic motivation refers to motivations which drive intrinsically the people to act spontaneously; apart from external rewards, the task itself is valuable and satisfying for individuals (Deci and Ryan, 2000; Li et al., 2010). Rahman (2001) showed that cognitive strategies predict the academic achievement of students positively and significantly. Kadivar (2004) defined meta-cognition as the knowledge of individuals of their own cognitive system and its control and believed that meta-cognition is cognition beyond ordinary thinking and understanding. In research on motivation and academic achievement, MkLlnd and colleagues (1953) found that those with high achievement motivation surpassed in their performance from the group with low achievement motivation.

This study aims to answer the questions in this respect:

How the cognitive and meta-cognitive strategies affect academic achievement?

Whether the basic psychological needs and motivational orientation are involved in academic achievement?

What is the role of motivational orientation in academic achievement?

What is the role of autonomy, competence, and communication in academic achievement?

RESEARCH OBJECTIVES

General objective:

Investigating the structural relationship between motivational (need for autonomy, competence, communication, and motivational orientation) and 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 relationship between motivational orientation and academic achievement.
- Determining the relationship between motivational orientation and cognitive strategies.
- Determining the relationship between motivational orientation and meta-cognitive strategies.
- Determining the relationship between the need for autonomy and motivational orientation.
- Determining the relationship between the need to communicate and motivational orientation.
- Determining the relationship between the need for competence and motivational orientation.
-Determining the structural relationship model of motivational (need for autonomy, competence, communication, and motivational orientation) and 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.
3. There is a positive and direct relationship between motivational orientation and academic achievement.
4. There is a positive and direct relationship between motivational orientation and cognitive strategies.
5. There is a positive and direct relationship between motivational orientation and meta-cognitive strategies.
6. There is a positive and direct relationship between the need for autonomy and the motivational orientation.
7. There is a positive and direct relationship between the need for competency and motivational orientation.
8. There is a positive and direct relationship between the need to communicate and motivational orientation.
9. Whether the structural pattern of relationship between motivation and cognitive predictors and academic achievement is a valid model?

RESEARCH BACKGROUND

In a study on the relationship among perceived teaching style, self-motivation, and creativity, Aegiie, Hejazi, and Gaazi Tabatabai (2013) showed that there is an indirect relationship between autonomous motivation and creativity and it is better that there will be mutual respect among individuals in a classroom and students could ask any questions and participate in discussions without worrying about the risk of being ridiculed or threatened.

In a study entitled (Academic achievement: The role of basic psychological needs and identity styles), Lavassani, khezri Azar, Amani, and Alizadeh (2011) confirmed the role of basic psychological needs and identity styles in academic achievement.

In a study entitled (The relationship between parenting styles and academic motivation and academic achievement among high school students), Reshvanloo and Hejazi (2009), surveys showed that the busyness of mother and warmth of father predicts the subscales including intrinsic motivation for learning, intrinsic motivation to experience stimulation, and academic achievement, and the support of mother from autonomy, warmth of mother, and busyness of father predict students' educational motivation.

In a study entitled the motivational model of English learning among elementary school students in Japan, Matsu Zaki, Ozaki, and Media (2013) showed that the teachers' perceived autonomy supports the predicted positive and intrinsic motivation.

In a study on the role of achievement goals, educational motivation, and learning strategies in statistics anxiety, Vestiani (2012) showed that achievement goals, educational motivation, and learning strategies affect statistics anxiety.

In a research on the students' perceptions of teacher support from autonomy and self-efficacy: the mediating role of psychological basic needs, Hejazi (2011) showed that there is a positive and significant relationship between the perception of teacher' support from autonomy and students' self-efficacy.

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), Niaazi el 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 role of psychological needs, motivational self-regulation, and academic emotions, Kavusian, Kadivar, and Farzad (2012) concluded that the basic psychological needs, motivational self-regulation, and academic emotions play mediating role among environmental variables which are supportive of students' self-determination and school welfare.

Weinstein et al. (2010) stated that the learning strategies include emotional, motivational, meta-cognitive, and behavioral activities and processes which facilitate the significant understanding, learning, and process such as new knowledge integration in memory.

METHODOLOGY

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:

Basic psychological needs Inventory:

In the present study, the La Guardia, Ryan, Couchman, and Deci's basic psychological needs scale (2000) was used to measure the basic psychological (autonomy, competence, and communication) needs. This scale consists of 21 items which measure three psychological needs: autonomy (7 items), competence (6 items), and communication (8 items). The items were set based on five-point Likert scale from absolutely wrong= 1 to absolutely right=5. The reliability of this questionnaire in this research was reported to be 0.86.

Motivational orientation Inventory:

The Pelletier, Rocchi, Vallerand, Deci & Ryan's Academic motivation scale (AMS) (2013) was used to measure students' motivational orientations. This scale consists of 18 items which measures the motivational orientation of intrinsic motivation (three items), mixed regulation (three items), self-allowed regulation (three items), internal regulation (three items), external regulation (three items), and lack of motivation (three items). The items were set based on seven-point Likert scale from absolutely irrelevant= 1 to absolutely relevant=7. The reliability of questionnaire in this research was reported to be 0.76.

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. The presented model in this study included basic psychological (autonomy, competence, communication) needs as exogenous variables and motivational orientations, 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:

Due to the fact that the correlation matrix is the basis of causal models' analysis such as path analysis, so the correlation matrix of variables along with correlation coefficients and their significance levels are presented in Tables to examine the relationship between variables before moving on to test the theoretical model.

Table 1: Correlation matrix of variables.

No.	Variable	1	2	3	4	5	6	1
1	Need for autonomy	1						
2	Need for competence	0.45**	1					
3	Need for communication	0.42**	0.34**	1				
4	Motivational orientation	0.32**	0.38**	0.29**	1			
5	Cognitive strategies	0.40**	0.32**	0.26**	0.39**	1		
6	Meta-cognitive strategies	0.35**	0.27**	0.18**	0.43**	0.63**	1	
8	Academic achievement	0.18**	0.24**	0.12**	0.38**	0.23**	0.36**	1

*p<0.05, **p<0.01

Table 2: Estimation of direct effects coefficients.

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
Motivational orientation	0/29	4/62	0/001
Cognitive strategies			
Motivational orientation	0/39	7/24	0/001
Meta-cognitive strategies			
Motivational orientation	0/43	8/21	0/001
Motivational orientation			
Need for autonomy	0/15	2/34	0/02
Need for competence	0/27	4/47	0/001
Need for communication	0/14	2/27	0/02

According to Table 1, there is a significant and positive correlation between the need for autonomy (p<0.01, r=0.32), the need for competence (p<0.01, r=0.38), and the need to communicate (p<0.01, r=0.29), and the motivational orientation. There is positive and significant correlation between motivational orientation and cognitive strategies (p<0.01, r=0.39), meta-cognitive strategies (p<0.01, r=0.43), and academic achievement (p<0.01, r=0.38). Also, there is significant and positive correlation between cognitive (p<0.01, r=0.23) and meta-cognitive (p<0.01, r=0.36) strategies and academic achievement.

According to Table 2, 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. The direct effect of motivational orientation in cognitive (0.39) and meta-cognitive (0.43) strategies was positive and significant at 0.001 level. Also, the direct effect of the need for competence in motivational orientation (0.27) was positive and significant at 0.001 and the direct effect of the need for autonomy (0.15) and competence (0.14) in this variable was positive and significant at 0.05.

According to Table 3, the total effect of motivational orientation in academic achievement (0.38) is positive and significant at 0.001 level.

According to Table 4, only the first hypothesis (the effect of cognitive strategies in academic achievement) was not confirmed; the other hypotheses were confirmed.

The evaluation of research hypotheses:

First hypothesis: there is relationship between cognitive strategies (semantic extension, repetition, review, and organization) and academic achievement.

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.

Table 3: Estimation of total effect coefficients.

Variables	Path coefficients	t statistics	Sig. level
Academic achievement			
Motivational orientation	0/38	7/12	0/001

Table 4: Evaluation of research hypotheses.

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
3	There is a positive and direct relationship between motivational orientation and academic achievement.	0/29	4/62	0/001	Confirmed
4	There is a positive and direct relationship between motivational orientation and cognitive strategies.	0/39	7/24	0/001	Confirmed
5	There is a positive and direct relationship between motivational orientation and meta-cognitive strategies.	0/43	8/21	0/001	Confirmed
6	There is a positive and direct relationship between the need for autonomy and the motivational orientation.	0/15	2/34	0/02	Confirmed
7	There is a positive and direct relationship between the need for competency and motivational orientation.	0/27	4/41	0/001	Confirmed
8	There is positive and direct relationship between the need to communicate and motivational orientation.	0/14	2/27	0/02	Confirmed
9	Whether the structural pattern of relationship between motivation and cognitive predictors and academic achievement is a valid model?	0/38	7/12	0/001	Confirmed

The results confirmed this hypothesis. According to table (4), the direct effect of meta-cognitive strategies (0.26) and t-statistics (4.47) in academic achievement is positive and significant at 0.001. This finding is consistent with research results of Yagoubi (2004), Fouladchang, Kadivar, and Farzad (2007), Kai (1992), and Yousefzade and Mesrabadi (2003).

Third hypothesis: there is a positive and direct relationship between motivational orientation and academic achievement.

The results confirmed this hypothesis. According to table (4), the direct effect of meta-cognitive strategies (0.29) and t-statistics (4.62) in academic achievement is positive and significant at 0.001. This finding is consistent with research results of Diener and Duke (1980).

Fourth hypothesis: there is a positive and direct relationship between motivational orientation and cognitive strategies.

The results confirmed this hypothesis. This finding is consistent with the finding of Mohsenpour (2001), Driscol (2000), Jetton and Alecsander (2001), and Pintrich, Paulsen, and Gentry.

Fifth hypothesis: there is a positive and direct relationship between motivational orientation and meta-cognitive strategies.

The results confirmed this hypothesis. This finding is consistent with the finding of Paulsen and Gentry.

Sixth hypothesis: there is a positive and direct relationship between the need for autonomy and motivational orientation.

The results confirmed this hypothesis. This finding is consistent with the finding of Deci and Ryan (2012) and Moltafet and Khayyer (2012).

Seventh hypothesis: there is a positive and direct relationship between the need for competence and motivational orientation.

The results confirmed this hypothesis. In their study, Chen and Chang (2010) showed that if basic psychological needs (autonomy, competence, communication) are satisfied, the sense of self-confidence and self-worth (motivational orientation) will be formed in individuals.

Eighth hypothesis: there is a positive and direct relationship between the need for communication and motivational orientation.

The results confirmed this hypothesis. The results showed that if the needs for competence, competence, and belongings are satisfied, people will be self-motivated (Deci and Ryan (2012) and Khayyer (2012)).

Ninth hypothesis: Whether the structural pattern of relationship between motivation and cognitive predictors and academic achievement is a valid model?

The results confirmed this hypothesis. The results showed that the structural pattern of relationship between motivation and cognitive predictors and academic achievement is a valid model.

RESEARCH SUGGESTIONS

-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.

-The consideration of motivation and meta-cognition leads to self-regulation, self-casting, self-checkout, self-determination, and self-reliance which result in academic achievement; therefore, the underlying factors which lead to academic achievement should be considered.

In the present study, the relationship among the three components of psychological (competence, communication, autonomy) needs was assessed, while the psychological needs have a wide range. Therefore, it is suggested that the relationship between academic achievement and other psychological components to be studied in future research.

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