The Relationship between Metacognition Skills with Academic Motivation and Academic Achievement among High School Students in Kerman, Iran

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Abstract

Background

Learning is the most important human attribute. Cognition plays an important role in it and metacognition is another form of cognition that monitors cognitive processes and plays an important role in motivating one to learn. This study aimed at investigating the relationship between metacognition skills with academic motivation and academic achievement in high school students in Kerman, Iran.

Materials and Methods

In this cross-sectional descriptive-analytic study, 332 first-grade high school students in Kerman city, Iran, in 2018-19 were selected using stratified random sampling method (160 girls and 172 boys). The data were collected using the McClelland Academic Achievement Scale, O'Neill's Metacognition Skills (1996), and students' first semester average point to measure their academic achievement. Data were analyzed by SPSS software (version 16.0) using multivariate regression.

Results

Findings showed that among the metacognition components, only planning had a significant effect on students' academic motivation ($P<0.05$). Furthermore, among the metacognition components, cognitive awareness and strategy had a significant effect on students' academic achievement ($P<0.05$). Findings also showed a significant positive relationship between students' academic motivation and academic achievement ($r = 0.128$, $P<0.001$).

Conclusion

The results of this study showed a positive and significant relationship between academic motivation and academic achievement in high school students.

Key Words: Academic Motivation, Academic Achievement, Metacognition Skills, Students.

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1- INTRODUCTION

In today's world, one of the hallmarks of any individual success is the academic achievement. Academic achievement refers to a person's ability learnt or acquired in school subjects as measured by standardized tests. Atkinson regards academic performance as a learned or acquired individual ability (1). Academic achievement is very important in an educational setting because it shows the level of competence of the students in terms of their educational content. It has often been seen that there are students who are very similar in terms of learning ability and aptitude but who differ greatly in academic achievement. This aspect of human behavior is related to motivation. Motivation refers to the intrinsic states of the organism that direct its behavior toward a particular goal. Therefore, motivation is an active factor in human behavior and is one of the factors that can have a significant impact on academic achievement (2). Academic motivation is one of the factors influencing students' academic achievement (3, 4).

Academic motivation is one of the types of motivation that is of particular importance to learners and students and is referred to the motivations, needs, and factors that make a person appear in the educational environment and obtain a degree (5). Metacognition is one of the factors that can identify students' academic motivation (5-7). The term metacognition means knowing how to learn. In fact, metacognition is a form of cognition that oversees cognitive processes. Cognitive skills enable one to increase their knowledge and performance, while their metacognition skills help guide and optimize the performance and application of knowledge in new situations; thus, metacognition is necessary to make cognition effective. Metacognition strategies are techniques that students use to monitor their own learning processes while guiding their mental processes in thinking, learning and remembering. Metacognition strategies are referred to as a set of planning, control, monitoring, and ordering strategies. These skills can be taught and learned by teachers and students (8). Research has shown the effectiveness of learning strategies on academic variables. Battalion et al. concluded that metacognition package training enhances students' self-leadership and self-leadership is among the factors that contribute to academic achievement (9). Moreover, Attarkhamenei and Seif (2009) reported that teaching metacognition strategies increases students' motivation and academic achievement (10). The results of a popular and multi-faceted study on factors affecting student learning showed that among the 330 factors affecting learning, cognitive processes and metacognition had the most impact on students' learning and academic achievement (11). Metacognition strategies are techniques taught to students to monitor their own learning processes, to guide their mental processes in thinking, learning and remembering. These skills can be taught and learned by teachers and students (12, 13). Since performance and academic failure are one of the measures of educational performance, discovering and studying the variables affecting academic performance leads to better knowledge and prediction of effective variables in school. Therefore, examining the variables related to academic performance in different courses is one of the main topics of research in education (14). Surveys showed that in-country research has mostly evaluated learning strategies and their impact on academic achievement (15-20). The aim of this study was to investigate the relationship between metacognition skills with academic motivation and academic achievement among high school students in Kerman, Iran.

2- MATERIALS AND METHODS

2-1. Study design and population

This was a descriptive (non-experimental) correlation study and consisted of all male and female high school students of Kerman who were studying in the academic year 2017-2018. The sampling method was multistage cluster random sampling. Using Morgan and Krejcie's table, the sample number was 332 individuals randomly selected from the education districts of Kerman. Of the high schools in the city, two high schools (one girls 'school and one boys' school) including 160 female students and 172 male high school students were selected randomly based on the population and gender of high school students.

2-2. Measuring tools: validity and reliability

The McClelland scale was used to measure academic achievement. The questionnaire consists of 40 questions with a 5-point Likert scale (strongly agree, agree, no idea, disagree, and strongly disagree). This questionnaire was developed based on David McClelland's theory of progress motivation. The grading method is that in Questions 5, 8, 9, 10, 17, 24, 27, 28, 31 and 35 have a reverse scoring method (5 for strongly disagree). The minimum score is zero and the maximum is 200. The content validity of the Academic motivation Questionnaire has been confirmed by its constructive validity as well as by the professors and experts. The reliability coefficient of academic motivation questionnaire was reported to be 0.83 using Cronbach's alpha method (21). The O'Neill (1996) metacognition questionnaire was used to measure metacognition skills. The test consists of 20 expressions and four sub-scales: awareness, cognitive strategy, planning, and self-assessment, each sub-scale has 5 sentences and the scoring is a 5-point Likert scale (from never to always).

Minimum score is zero and maximum score is 100. The validity of the questionnaire was confirmed to be 0.91 and its reliability was 0.87 by Parvizi and Sharifi (22). To measure students' academic achievement, their first semester average point was used in the 2018-19 academic year.

2-3. Ethical consideration

Participation in this study was completely voluntary. Prior to collecting information, informed consent form was obtained from each participant. Students were allowed to withdraw from the study at any stage of the study, and participants were assured that the findings of the study would be reported in general.

2-4. Data Analyses

SPSS software version 16.0 was used for data analysis. Descriptive statistics indices (mean and standard deviation), and inferential statistics including Pearson correlation and multivariate regression were used to describe the data. Kolmogorov-Smirnov test was used to verify the normal distribution of variables. P- value less than 0.05 was considered statistically significant.

3- RESULTS

The study included 332 first-year high school students and 51.8 percent (172) of them were male students. Kolmogorov-Smirnov test showed that the distribution of variables was normal. The mean and standard deviation of students' metacognition, academic motivation, and academic achievement skills are shown in **Table.1**. Multivariate linear regression analysis showed that among the metacognition components, only planning had a significant effect on students 'academic motivation (P=0.000), but their awareness, cognitive strategy and self-assessment had no significant effect on students' academic motivation (P=0.000) (**Table.2**).

Table.1: Mean and standard deviation of metacognition, academic motivation, and academic performance in high school students (n = 332).

Variables	Mean (SD)	Ranged
Metacognition	55.71 (4.74)	0-100
Academic motivation	134.84 (17.02)	0-200
Academic performance	17.36 (1.40)	0-20

Table.2: Regression Coefficient Model of Relationship between Metacognition Skills (awareness, cognitive strategy, planning and self-assessment) with students' Academic Motivation.

Variables	B	Standard error	Beta	t-value	P-value
Fixed	113.755	10.743	-	10.588	.000
Awareness	.101	0.383	.014	.264	.792
Cognitive strategy	-.197	0.402	-.026	-.491	.624
Planning,	1.570	0.375	.226	4.181	.000
Self-assessment	0.056	0.384	.008	.147	.883

Multivariate linear regression analysis showed that among the components of metacognition, awareness and cognitive strategy had significant effect on students 'academic achievement (P <0.05), but planning and self-assessment did not have significant effect on students' academic achievement (**Table.3**).

Analysis of data by Pearson test showed that the correlation coefficient between the two variables of academic motivation and academic achievement was 0.128 (P= 0.002). In other words, the greater the academic motivation of students, the greater their academic achievement (**Table.4**).

Table.3: Regression Model Coefficients of the Relationship between Metacognition Skills (awareness, cognitive strategy, planning and self-assessment) with Students' Academic Achievement.

Variables	B	Standard error	Beta	t-value	P-value
Fixed	15.110	.895	-	16.892	.000
Awareness	.088	.032	.150	2.755	.006
Cognitive strategy	.073	.033	.119	2.192	.029
Planning,	.025	.031	.043	.789	.430
Self-assessment	-.025	.032	-.043	-.788	.431

Table.4: Pearson correlation statistics on the relationship between students' academic motivation and their academic achievement.

Variable	Academic achievement					
	Pearson correlation		R^2	Number	Correlation	Type of correlation
Academic motivation	r	Sig.				
	0.128	0.0020.016		332	Yes	Positive

4- DISCUSSION

The purpose of this study was to investigate the relationship between metacognition skills with academic motivation and academic achievement in Kerman high school students, Iran. The results of multivariate linear regression showed that there was a significant linear relationship between the components of metacognition (awareness, cognitive strategy, planning and self-assessment), and academic motivation of students. These four variables explained 0.040 variance of students' academic motivation,

and planning was the best predictors of students' motivation. These results are consistent with findings by Abd Elah Pour et al. (19), Maleki (23), and Berardi-Coletta et al. (2001), which showed that metacognition processing had a positive effect on problem solving learning and learning transfer (24). Other results of the present study showed a significant linear relationship between metacognition components (awareness, cognitive strategy, planning and self-assessment) with students' academic achievement and the four variables included in this model explained 0.028 of students' academic achievement variance. Awareness and cognitive strategy were better predictors of students' academic achievement. These results are in line with the findings of Mevarech and Amrany (25), Cai and Lester (26), Fouladchang (27), and Mohammad Amini (28) who concluded that the metacognition skills and their application enhance academic improvement.

According to the results of this study, there was a significant and positive relationship between students' academic motivation and their academic achievement. That is, the greater the academic motivation of the students, the more their academic achievement will be. These results are in line with the findings of Shahraray et al. (29), and Zarei (30) who showed a significant relationship between academic achievement and motivation of students. Various studies have shown that explaining students' learning is not only possible through their motivational properties but also self-regulating mechanisms including cognitive and metacognition features (31). Therefore, teaching and paying attention to the way students learn and study, and its timely correction by the teacher can be effective in educational status and thereby increase students' motivation. According to Lotfabadi (32), metacognition strategies

are taught to students to help organize thought, behavior and social patterns, self-assessment, oral practice, self-education, self-awareness, and self-esteem. One of the most prominent features of such training, he believes, is that it enhances one's awareness of intellectual processes and increases one's awareness of how to control one's own intellectual processes. The most important advantage of metacognition knowledge is that it enables the learner to be aware of his or her learning activity and his /her performance moment by moment and to identify his/her weaknesses and strengths, thereby achieving a desire to improve his/her academic performance. Given that students' development in school and adulthood depends not only on their abilities but also on their motivation, attitudes, and other issues that contribute to their success, the level of learning is increased when the motivating factors are provided to the students, and, similarly, the success rate increases (33).

It is necessary that education policy makers, in macro planning, emphasize indicators such as academic motivation for student achievement and create appropriate conditions for enhancing student academic motivation. They should provide teachers, principals, and counselors with instructions on how to use metacognition strategies in teaching and expand students' daily lives to provide them with an academic motivation to achieve academic achievement. They should provide students with motivation to develop their field of study in all courses and provide classroom activities tailored to their students' capacity, to motivate them. Appropriate ways to measure students' academic performance and noting their progress should be granted. Teachers should be aware of the prior knowledge of students and choose the appropriate teaching method. School officials should hold workshops for teachers on ways to

enhance students' metacognition skills. School counselors should try to provide teachers with tips on ways to enhance their motivation and distribute them free of charge to teachers.

4-1. Study Limitations

This study was conducted only on high school students in one district of Kerman, Iran.

5- CONCLUSION

Multivariate linear regression analysis showed that among the metacognition components, only planning had a significant effect on students 'academic motivation, but their awareness, cognitive strategy and self-assessment had no significant effect on students' academic motivation. Multivariate linear regression analysis showed that among the components of metacognition, awareness and cognitive strategy had a significant effect on students' academic achievement, but planning and self-assessment had no significant effect on students' academic achievement. The findings showed that there was a positive and significant relationship between students' academic motivation and their academic achievement. In other words, the more academic motivation students have, the higher their academic achievement will increase. Therefore, awareness of one's own cognitive structure in the form of self-awareness, cognitive, planning, and self-assessment strategies has the potential to become universal and motivate learning.

6- CONFLICT OF INTEREST: None.

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