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Predictors of Academic Motivation: Epistemological Beliefs, Learning Approaches and Problem Solving Skills

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ABSTRACT

Students have difficulties in involving, engaging, and motivating in studying and learning activities and one of the reasons of which is regarded as academic motivation that is a main predictor of academic success. There are also some external factors having effect on academic motivation and performance. In this study, we aimed to examine the differential predictive relationships of undergraduates' epistemological beliefs, learning approaches and problem solving skills on academic motivation. The study group is consists of 750 university students continuing their study at Yildiz Technical University, Istanbul. For the method of the research, the correlational analysis technique of a descriptive research model was used. The data was collected through "Academic Motivation Scale", "Epistemological Beliefs Scale", "Learning Strategies Scale" and "Problem Solving Skills Scale". This research reveals that university students' academic motivation, epistemological beliefs, learning strategies and problem solving skills had some significant relationships between one another. According to the findings, university students' epistemological beliefs and learning strategies predicted amotivation, extrinsic motivation and intrinsic motivation significantly. However, it was found that university students' problem solving skills did not predict amotivation, extrinsic motivation and intrinsic motivation significantly.

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Introduction

One of the psychological concepts affecting on education is surely motivation which integrates energy, direction and persistence into learning and teaching environment. Motivation also influences learner's attitude and learning behaviour significantly during individual learning process (Deci & Ryan, 1985; Fairchild et al., 2005; Vallerand et al., 1992). Moreover, in terms of biological, cognitive and social regulation motivation might be appreciated as one of the central issues in the field of psychology (Ryan & Deci, 2000). The first step of the study of motivation begins to study human behaviour with the question of 'Why' (Deci & Ryan, 1985). Indeed, the results of much research have shown that motivation is in close relation with persistence, curiosity, learning and academic performance (Deci & Ryan, 1985). Consequently, it is easy to understand researchers' interest for motivation in educational context.

Recent research findings have pointed that having positive attitude and high motivation make students show self-regulatory and achievement drifted behaviours and so have high academic performance (Pintrich & Schunk, 2002; Green et al., 2006; Linnenbrink & Pintrich, 2002). It is generally known that motivation is one of the necessities for learning process and academic achievement so high motivated students spend much more time in engaging and studying their courses as well as doing their homework

(Pintrich & Schunk, 2002; Pintrich, 2003a) and do better in their courses, while comparing with the unmotivated ones. The social setting of a learning process can influence the students' motivation level (Black & Deci, 2000). For example, the instructional designs can affect students' subsequent learning process and performance (Vansteenkiste et al., 2004). Research in this field has indicated that quality of school engagement and performance (Ames, 1992) and students' persistence level during difficult situations are predicted by students' motivation.

The significant number of researches has shown that whereas there are some external factors affecting on academic achievement or failure, the role of internal factors influencing academic performance directly is far more important than those. The significant amount of research putting some variables such as intrinsic motivation, perceptions of belonging and ability, valuing of academic tasks in the center revealed that motivation can influence academic achievement and related variables (Greene et al., 2004). According to some research, intrinsically motivated students show more persistence while going through academic challenge (Boyd, 2002), eager to perform a duty (Johnson et al., 1998), perform higher academic performance (Vallerand et al., 1993), have deeper academic self-concept (Cokley et al., 2001) and show more creative outputs (Moneta & Sui, 2002). Also, some outcomes relating to school as work quality, objectives, exam scores, grades, learning behaviours, attention and effect have strong impact on students' motivation (Hidi & Harackiewicz, 2000; Linnenbrink & Pintrich, 2002; Pintrich et al., 2003).

Several recent researches have pointed out that academic motivation is regarded as a strong predictor of students' academic achievement and performance (Linnenbrink & Pintrich, 2002; Green et al., 2006). According to Baker's research (2003) intrinsic motivation, which means doing an activity voluntarily, has a positive effect on students' academic performance and competencies. On the other hand, extrinsic motivation, which means doing an activity for external rewards, has been linked with lower academic engagement. Likely, amotivation, which means being neither intrinsically or extrinsically motivated, has been negatively related to educational process and outcomes negatively (Vallerand et al., 1989; Vallerand & Bissonnette, 1992). Hence, academic motivation can lead teachers and researchers to search for the ways how students adapt school environment better. The number of academic motivation researches concentrating on its relevants such as learning strategies, academic performance and thinking styles have been increased significantly recently (Komarraju & Karau, 2005).

Individuals may differ in terms of their educational preferences such as learning styles and learning approaches. These individual differences help and guide educational experts in designing educational context and environment and also affect the level and type of motivation students have. While some learners are willing to take advantage of learning opportunities intrinsically others have no positive attitude towards learning context. Stipek (2002) connotes that these differences derives from both personal and contextual factors. While academic performance, academic achievement, thinking styles, and learning styles have been subject to researches as individual differences, few researches have concentrated on individual differences relating to academic motivation recently. However, academic motivation as a strong predictor of academic performance deserves to be hot topic in educational researches (Linnenbrink & Pintrich, 2002). The current study was designed to determine whether epistemological beliefs, learning approaches and problem solving skills predict academic motivation.

Academic Motivation

Behaviour is stimulated, directed and continued by an inner state called motivation. A number of motivational theories is based on intrinsic and extrinsic motivation such as self-determination theory (Deci & Ryan, 2000a), expectancy-value theory (Wigfield, Tonks, & Eccles, 2004), self-efficacy theory (Zimmerman, 1998), attribution theory (Weiner, 1985), and achievement goal theory (Elliot, 1999).

Academic motivation can be expressed as the elements that affect students to adapt to school and learning environment, show high performance, and succeed in getting a degree. Among some motivational theories, Deci and Ryan's Self-determination theory (SDT) is one of the best known theories with the factors of intrinsic motivation, extrinsic motivation, and amotivation (Deci & Ryan, 1985, 1991). SDT classifies four types of behavioral regulations with levels of self-determined motivation as external regulation, introjected regulation, identified regulation, and intrinsic motivation. *External regulation*, indicating to behavior

controlled by external means, is the least self-determined form of extrinsic motivation. *Introjected regulation* is explained as internally controlled or self-imposed behavior. *Identified regulation*, referring to acting in terms of one's choice or values, is a more self-determined form of extrinsic motivation. *Intrinsic motivation*, indicating the behavior that emerges from the self and undertaken solely for its own sake, is the highest level of self-determination.

These behavioral regulations of self-determination can be ranged from external to internal. While Deci and Ryan (1985) defines integrated regulation as the most self-determined form of extrinsic motivation, it was excluded from this study because this regulation is mainly found in adult population. Apart from these four behavioral regulations, the state of amotivation, which means individuals' perceptions about lack of contingency between their actions and outcomes and having no intention to act, refers to a different category at the external end of the motivational process. This theory has yielded to a great deal of research in the field of education (Deci, Vallerand, Pelletier, & Ryan, 1991). Most of the motivation theories focus on two-factor structures ranging from motivated behavior, referring to do something willingly, to amotivated behavior, referring to do something unwillingly. However, SDT segmented the motivated behavior into two categories as intrinsic and extrinsic motivation and a factor referring to lack of motivation as amotivation (Deci & Ryan, 1985).

Theoretical themes of Deci and Ryan's model (1985) was restructured by Vallerand and his colleagues by claiming that goals, values and attitudes motivating learners intrinsically can become different. This is a hierarchical structure consisting of three higher-order factors as *intrinsic motivation*, *extrinsic motivation*, and *amotivation* and six second-order factors three of which make up extrinsic motivation as *identified type of regulation, introjected type of regulation, and external type of regulation and* three of which refer to intrinsic motivation as *intrinsic motivation to know, intrinsic motivation towards accomplishments, and intrinsic motivation to experience stimulation* (Vallerand et al., 1992). The behaviors causing the person giving personal value to the behavior (*identified* type of regulation), the behaviors controlled by the environment and internal reward/punishment possibilities (*introjected* type of regulation), and the behavior regulated via external means as rewards and limitations (*external* type of regulation) constitute subfactors within extrinsic motivation. Doing an activity for the pleasure to learn and explore (*intrinsic motivation to know*), participating an activity for the pleasure to accomplish or succeed (*intrinsic motivation toward accomplishments*), and engaging an activity to experience stimulation (*intrinsic motivation to experience stimulation*) compose subfactors within intrinsic motivation (Deci & Ryan, 1985). In addition to intrinsic and extrinsic motivation, third type of motivational construct, named as *amotivation*, which is the fact of stopping to participate in academic activities and being neither intrinsically nor extrinsically motivated, was posited by Deci and Ryan (1985).

Our purpose in this research was to examine the differential predictive relationships between undergraduates' epistemological beliefs, learning approaches and problem solving skills on academic motivation. Focusing on a synthesis of previous researches, the present study evaluated predictive strengths of factors and subfactors on both present and future motivational outcomes.

Epistemological Beliefs and Academic Motivation

A large amount of research has continuously pointed that beliefs and perceptions of students are strong predictors of academic achievement. Individuals' beliefs concerning on knowledge and learning process are termed as epistemological beliefs. Epistemological beliefs reflect the individual opinions regarding the discussions such as knowledge, gaining of knowledge, accuracy degree of the knowledge, the criteria and limitations of the knowledge (Brownlee, Purdie, & Boulton-Lewis, 2001). Schommer (1994) indicated that personal thoughts about the nature of knowledge and ways of learning are named as epistemological beliefs, culturally changing and appropriate. Recently, there has been a significant increase in the studies of epistemological beliefs that is thought to be an important area of individual differences, to have effects on the learning process and to develop university students' epistemological beliefs (Sander, 2005).

Lately, in some studies it has been claimed that epistemological beliefs of students may be related to academic motivation (Buehl, 2003; Pintrich & Zusho, 2002). Especially, the study carried out by Pintrich and

Zusho (2002) suggested that epistemological beliefs may cause personal objectives that promote adaptive strategic processing. Moreover, Muis et al. (2006) claimed that personal epistemology may be covered through a model with different levels such as general, academic, and domain-specific academic beliefs. In this respect, the epistemological belief, thought as the mind can be processed, might drives the students to learning objectives and in return might cause the type of learning oriented behavior (Schommer-Aikins, 2004).

In Buehl's model of relationships between students' epistemological beliefs, academic motivation and task performance, Buehl (2003) claimes that epistemological beliefs are seen as both goal orientations, task value beliefs and perceived self-efficacy. Also, some research has pointed that there may be some variables relating to students' epistemological beliefs such as personal interest (Buehl, Murphy, & Monoi, 2003), achievement goal orientations and perceived self-efficacy (Buehl et al., 2003). In addition to predicting academic cognition and performance (Hofer, 2000; Schommer, 1990, 1993), epistemological beliefs may be linked to students' achievement goals. In some research done by Molden and Dweck (2006) and Hofer (2000), the studies relating to possible relationships and connections among epistemological beliefs, academic motivation and academic achievement were recommended as a requirement. Paulsen and Feldman (2005) achieved similar findings about the effects of epistemological beliefs on students' self-regulated learning and motivational strategies. The result of this study indicated that if students believe in that learning ability is fixed, they less likely sustain intrinsic and extrinsic goal orientation. As a result of the research, it was found that epistemological beliefs have significant effect on the students who use self-regulating motivational strategies.

Learning Strategies and Academic Motivation

Students differentiate in terms of their learning strategies. These differences, in general, are related to their opinions on learning that affect their perceptions of learning context (Entwistle & Ramsden, 1983; Entwistle, McCune, & Walker, 2001). Literature on learning approaches in education essentially focus on three approaches as surface approach, deep approach, and strategic approach (Entwistle, McCune, & Walker, 2001; Entwistle & Ramsden, 1983). In the first place, Trigwell and Prosser (1991) defines *surface approach* for learners as attempting to rote learning material in order to reproduce it, and describing an intention to carry out the task with little participation or engagement. Moreover, procedural problem solving, routine and unreflective memorization are regarded as strategies connected with surface approach which is related to lower quality outcomes and results from assessment methods which reward reproducing information or heavy workload as well (Entwistle et al., 2001; Trigwell & Prosser, 1991). In contrast with surface approach, students taking over *deep approach* that is associated with an intention to comprehend are in search for meaning to understand (Trigwell & Prosser, 1991; Entwistle et al., 2001). Deep approach comes out in learning contexts where students' interest and enthusiasm are supported by the instructor to manage their own learning (Biggs, 1999; Trigwell & Prosser, 1991). One of the main aims of high education is to develop students' deep approach consistent with high quality outcomes (Trigwell & Prosser, 1991). Lastly, *strategic approach*, describing effective and organised study methods regarding determination and motivation to achieve, is adopted by the students showing strong determination to perform well, succeed and get high grades (Entwistle & Ramsden, 1983; Entwistle et al., 2001).

Since learners often face challenging and changing situations nowadays development and maintenance of learning motivation has gained importance as an important precondition of learning process. Therefore, the strong relationship between learning approaches and motivational beliefs have been supported in educational literature (Pintrich & De Groot, 1990; Pintrich, 1990) and the direction of this relationship have been still in discussion. Pintrich and De Groot (1990) assume that motivation predicts self-regulatory approaches of learners, so more motivated students use learning approaches more often than less motivated ones. In other words, more motivated students engage in learning contexts and tasks and are regarded as more strategic, so their use of strategies can predict students' self-efficacy and motivation. Entwistle and Wilson (1977), who administrated items measuring approaches to studying together with items measuring motivation, were the first to investigate the relationships between state motivation and approaches to studying. Factor and cluster analyses demonstrated associations between strategic approach to studying and intrinsic motivation (deep cognitive involvement in study materials, engagement in

challenging activities, personal progress, performance feedback, flexible balance between interest and assessment focus, lack of interest in simple routine tasks) and between surface approach to studying and extrinsic motivation (ego involving rewards and punishments, ego involving anticipations of success or failure and emotions of pressure and tension).

Problem Solving Skills and Academic Motivation

Problem solving skills, which become the hallmark of efficient learners, are regarded as one of the significant contemporary skills students have to adapt and teaching and learning of it has been a fundamental research area in education lately. Learners must transfer the acquired knowledge while learning new topics and solving new problems, therefore learning with understanding gains importance because of being generative and enabling to improve transfer. Also, cognitive, conative and metacognitive skills are associated with competent students and expert problem solvers.

The motivational efficiency hypothesis, which specifies that positive motivational beliefs such as personal goal orientations (Stone, 2000), self-efficacy (Pintrich & De Groot, 1990; Pintrich, 2000) and intrinsic motivation to metacognitive strategy use (Linnenbrink & Pintrich, 2003), are consistent with solving problems efficiently. Within the frame of Self-determination Theory by Deci and Ryan (1985, 1991), it is claimed that individuals with high perception of problem solving skills have more self-determined profile and therefore rather than obtaining extrinsic awards they perform academic behaviours more because of intrinsic reasons. Such individuals are less amotivated in comparison with those having lower perception of problem solving skills. For example, efficient problem solvers adjust to university easily and are more intrinsically motivated for academic studies, one of the indicators of academic performance (Baker, 2003). In this study, Baker suggested that problem solving appraisals were an efficient and strong predictor of learners' adjustment to university, motivational behaviors, stress level, academic performance. This result supports the researchers which assume that more intrinsically motivated behaviors are correlated with higher academic achievement and academic performance (Deci & Ryan, 1985, 1991). In addition, this study also pointed that some learners avoiding participation in activities, showing lower personal control beliefs and a tendency to avoid problematic situations had higher amotivational orientation. According to self-determination theory (Deci & Ryan, 1985, 1991), amotivated students are most likely to feel lack of control because of their lower perception between their behaviors and outcomes. Some studies indicated that problem solving avoidance is linked to amotivation such as lethargy and greater levels of boredom (Elliot et al., 1999), lack of decision making (Maydeu-Olivares & D'Zurilla, 1996) and social withdrawal (D'Zurilla & Chang, 1995). Besides, the recent studies of motivation have revealed that motivation has a significant role in the transfer of problem solving skills (Pintrich & Schunk, 2002; Elliot, 1999).

Heppner et al. (1982) claimed that while problem solving confidence was connected with identified extrinsic motivational orientation not only individual personal but also style of avoidance was associated with amotivation. It was also found that more confident problem solvers are more motivated, more persistent and systematic and have higher perception and expectation of success. The results were obtained concerning that problem-based learning enhances intrinsic motivation (Groves, 2005; Hwang & Kim, 2006), that the quality of problem influences motivation (Noordzij & Te Lindert, 2010), that the students' interest level in the problem has a positive relationship with intrinsic motivation and problem-based learning stimulates basic psychological needs such as autonomy and competence (Noordzij & Te Lindert 2010; Mac Iver, 1991; Vansteenkiste, Simons, Lens, Sheldon, 2004; Vansteenkiste, Simons, Lens, & Soenens, 2004). Besides, competence, which is positively influenced through using challenging problems and activating prior knowledge, can affect intrinsic motivation (Mac Iver et al., 1991).

Current Study

In this research, it was tried to predict academic motivation through epistemological beliefs, learning strategies and problem solving skills as individual differences. At the result of literature review, as independent variables, *epistemological beliefs* was chosen since the beliefs of students about knowing and nature of knowledge has effect on learning process and academic success; *learning strategies* was chosen since they have effect on students' academic feelings and success; *problem solving skills* was chosen because of one of the significant characteristics of motivational orientations and academic performance. Determining the

prediction of academic motivation through these variables has gained importance in terms of instructional methodologies, psychological consultation and guidance for adaptation of the students to university, academic performance and for the base of the research on academic motivation. In this study, it was aimed to determine the type of academic motivation undergraduates have, to clarify its relationship with those variables, to reach undergraduates to expected motivation level and to make suggestions on requirements to increase academic success.

For the sub-problems of this correlational research design was used. Within the context of this model, amotivation for the first sub-problem, extrinsic motivation for the second sub-problem and intrinsic motivation for the third sub-problem were used as dependent variables. For the sub-problems of the research, sub-factors of epistemological beliefs (the belief learning depends on effort, the belief learning depends on ability, there is only one unchanging truth), sub-factors of learning strategies (surface learning, deep learning, strategic learning) and problem solving skills represented the independent variables. The research question and sub-problems of this research are as follows:

1. What is predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on academic motivation?

    a. What is predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation?

    b. What is predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on extrinsic motivation?

    c. What is predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation?

Method

In this study aiming to find out the prediction of academic motivation using university students' epistemological beliefs, learning strategies and problem solving skills, descriptive research model and also for the sub-problems of the study relational screening model were used. Correlational research design are those aiming to find out whether there is a correlation or the level of correlation among two or more variables (Karasar, 2003). Within this model, amotivation for the first sub problem, extrinsic motivation for the second sub-problems and intrinsic motivation for the third sub problem are considered as dependent variables. In all sub-problems of the study, the sub-factors of epistemological beliefs (effort, ability, sole truth), the sub factors of learning strategies (superficial, deep, strategic) and problem solving skills are considered as independent variables.

Participants

The study group of this study consisted of 750 undergraduates who studied in ten different faculties at Yildiz Technical University, Istanbul, Turkey. The study group was chosen via stratified sampling which is used on the condition that there are sub-units or sub-layers which are limited (Yıldırım & Şimşek, 2005).

There were 69 (%9.2) students studying in School of Mechanical Engineering, 110 (%14.7) in School of Electrics & Electronics, 38 (%5.1) in School of Civil Engineering, 79 (%10.5) in School of Chemical & Metallurgical Engineering, 32 (%4.3) in School of Naval Architecture & Maritime, 51 (%6.8) in School of Acrhitecture, 92 (12.4) in School of Arts & Science, 126 (%16.8) in School of Economics § Administrative Sciences, 129 (%17.2) in School of Education and 24 (%3.2) in School of Arts & Design. The number of female undergraduates was 364 (%48.5) and that of male students was 386 (%51.5). 450 (%60) of the undergraduates studied in the disciplines of applied sciences and 300 (%40) of the students studied in the disciplines of social sciences. There were 242 (%32) the first grade undergraduates, 139 (%18.5) the second grade undergraduates, 221 (%29.5) the third grade undergraduates and 148 (%19.7) the fourth grade undergraduates.

Table 1. Demographic ınformation of study group

Demographic Information		f	%
Faculty			
	Mechanical	69	9.2
	Electrics & Electronics	110	14.7
	Civil Engineering	38	5.1
	Chemical-Metallurgical Engineering	79	10.5
	Naval Architecture & Maritime	32	4.3
	Architecture	51	6.8
	Arts & Sciences	92	12.3
	Economics & Administrative Sciences	126	16.8
	Education	129	17.2
	Arts&Design	24	3.2
	Total	750	100
Field			
	Applied Sciences	450	60
	Social Sciences	300	40
	Total	750	100
Gender			
	Female	364	51.5
	Male	386	48.5
	Total	750	100
Grade			
	First	242	32.3
	Second	139	18.5
	Third	221	29.5
	Fourth	148	19.7
Total		750	100

Data Collecting Instruments

In this research, as data collecting instruments, to identify undergraduates' academic motivation level, *Academic Motivation Scale* developed by Vallerand and et al. (1992) adapted into Turkish with validity and reliability studies by Karatas and Erden (2012); to define undergraduates' epistemological beliefs, *Epistemological Beliefs Scale* which was developed by Schommer (1990) and adapted into Turkish with validity and reliability studies by Deryakulu and Büyüköztürk (2002); to define undergraduates' learning strategies, *Learning Strategies Scale* developed by Ekinci (2008); to define undergraduates' problem solving skills, Problem Solving Skills Scale (PSSS) developed by Heppner and Petersen (1982) and adapted into Turkish with validity and reliability studies by Şahin, Şahin and Heppner (1993) were used.

Academic motivation scale (AMS). Academic Motivation Scale (Vallerand et al., 1992) functionalises self-determination theory by measuring three intrinsic subscales, three extrinsic subscales and amotivation in academic contexts. AMS is a scale composed of 28 items to determine reasons why students attend school (Vallerand et al., 1992). Based on Deci and Ryan's self-determination theory (1985) its structure has seven factors: three measures of intrinsic motivation as to know, intrinsic toward accomplishments and intrinsic motivation to experience stimulation; three measures of extrinsic motivation as identified regulation, introjected regulation and external regulation; and amotivation. The reliability and validity of the AMS were established with measures of internal consistency, test-retest reliability, concurrent validity, and construct validity (Vallerand et al., 1992, 1993). In this study, AMS, developed by Vallerand and et al. (1992) and

adopted into Turkish by Karatas and Erden (2012), was used. With respect to reliability of the original scale, results obtained from this study revealed that the internal consistency of the scale was .97, and that of all subscales was adequate, typically ranging from .78 to .87. The total score obtained from each subscale indicates person's academic motivation level in terms of that subscale. In addition, evaluation of the scale can be done according to the joined three scales.

Epistemological beliefs scale (EBS). Epistemological Beliefs Scale (EBS), developed by Schommer (1998) and adapted to Turkish by Deryakulu and Büyüköztürk (2002), was used in this study. EBS is made up of three factors: "Belief that learning is based on attempt" (attempt), "Belief that learning is based on ability" (ability), and "Belief that there is one truth" (one truth). The factor of attempt included 18 items, of which 17 were negative and one was positive. The factor of ability comprised nine items, all of which were positive statements. The factor of one truth consisted of eight items, all of which were positive statements. The participants responded to all items using the Likert-type scale. In this scale, only factor scores were used; the total scores were not taken into consideration. Higher scores for each factor refer to the fact that participants have underdeveloped beliefs about the factor at hand, whereas lower scores in each factor refers to the fact that participants have developed beliefs about the factor at hand (Deryakulu & Büyüköztürk, 2002). Test-retest reliability of the original scale scale was .74. Test-retest reliability of the original factors varied between .85 and .63 (Schommer, 1993). In the current study, the Cronbach alpha coefficient for the factors was found to vary between .66 and .73. The Cronbach alpha coefficient for the scale as a whole was found to be .67.

Learning strategies scale (LSS). Learning strategies are considered as three groups such as deep, superficial and strategic in literature (Biggs, 1999). Therefore, this scale developed Ekinci (2008) does not aim to specify what the learning strategies are, but aims to show which one of those strategies the students prefer. LSS was formed as five-point-likert scale. LSS has 54 items and three factors, each factor of which has 18 items. In the current study, the Cronbach alpha coefficient for the factors was found to vary between .86 and .89. The Cronbach alpha coefficient for the scale as a whole was found to be .86.

Problem solving skills scale (PSSS). University students' problem solving skills were evaluated through Problem Solving Skills Scale developed by Heppner and Peterson (1982) and adapted to Turkish by Şahin, Şahin and Heppner (1993). It was a likert type scale consisting of 32 items and scored from 1 to 6. The Cronbach alpha coefficient for the scale as a whole was found to be .90. In the current study, the Cronbach alpha coefficient for the factors was found to vary between .22 and .60. The high scores obtained from the scale indicate that the students perceive themselves insufficient about problem solving skills.

Data Analysis

In order to determine whether there is a significant relation among university students' epistemological beliefs, learning strategies, problem solving skills and academic motivation, the analysis pearson correlation coefficient was used. In addition, to confirm the predictive power of independent variables of the study such as epistemological beliefs, learning strategies and problem solving skills on university students' academic motivation multiple regression analysis was applied.

<center>**Results**</center>

The purpose of the study is to find out the prediction of academic motivation through university students' epistemological beliefs, learning strategies and problem solving skills. Therefore, this section of the study includes the findings relating to university students' epistemological beliefs, learning strategies, problem solving skills and academic motivation. Firstly, the normality distribution of university students' epistemological beliefs, learning strategies and problem solving skills was tested, and then the correlation between the sub factors of academic motivation and epistemological beliefs, learning strategies and problem solving skills was analyzed through Pearson correlation coefficient. Finally, predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on their level of amotivation, extrinsic motivation and intrinsic motivation was analyzed via multiple regression analysis. Table 2 shows the correlation of the scores of university students' amotivation, extrinsic motivation and intrinsic motivation with their scores of epistemological beliefs, learning strategies and problem solving skills.

Table 2. The correlation of university students' academic motivation with their epistemological beliefs, learning strategies and problem solving skills

Scale / Sub factors			Academic Motivation Scale		
			Amotivation	Extrinsic Motivation	Intrinsic Motivation
EBS	Belief on Effort	r	-.18**	.24**	.32**
		p	.00	.00	.00
	Belief on Ability	r	.22**	.10**	-.00
		p	.00	.00	.90
	Belief on One truth	r	.05	.24**	.12**
		p	.15	.00	.00
LSS	Deep Learning	r	-.16**	.13**	.39**
		p	.00	.00	.00
	Superficial Learning	r	.19**	.46**	-.39**
		p	.00	.00	.00
	Strategic Learning	r	.37**	.08*	-.18**
		p	.00	.01	.00
PSS	Problem Solving Skills Total score		-.00	.04	.03
		p	.88	.24	.42

**The correlation is significant at .01 level
* The correlation is significant at .05 level

In Table 2, the findings regarding amotivation showed that there was a significant negative correlation between amotivation and belief on effort (r = -.18, p < .01), a significant positive correlation between amotivation and belief on ability (r = .22, p < .01), no significant correlation between amotivation and belief on one truth (r = .05, p > .05), a significant negative correlation between amotivation and deep learning (r = -.16, p <. 01), a significant positive correlation between amotivation and superficial learning (r = .19, p < .01), a significant positive correlation between amotivation and strategic learning (r = .37, p <. 01), and no significant correlation between amotivation and problem solving skills (r = -.00, p > .05).

As also seen in Table 2, the findings relating to extrinsic motivation revealed that there was a significant positive correlation between extrinsic motivation and belief on effort (r = .24, p < .01), belief on ability (r = .10, p < .01), belief on one truth (r = .24, p < .01), deep learning (r = .13, p < .01), superficial learning (r = .46, p < .01), strategic learning (r = .08, p < .05), and no significant correlation between extrinsic motivation and problem solving skills (r = .04, p > .05).

Found in Table 2, the findings in terms of intrinsic motivation indicated that there was a significant positive correlation between intrinsic motivation and belief on effort (r = .32, p < .01), no significant correlation between intrinsic motivation and belief on ability (r = -.00, p > .05), significant positive correlation between intrinsic motivation and belief on one truth (r = .12, p < .01), a significant positive correlation between intrinsic motivation and deep learning (r = .39, p < .01), a significant negative correlation between intrinsic motivation and superficial learning (r = -.39, p < .01), a significant negative correlation between intrinsic motivation and strategic learning (r = -.18, p < .01), and no significant correlation between intrinsic motivation and problem solving skills (r = .03, p > .05).

Predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation

The first sub-question of the study was that the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation. For this reason, multiple regression analysis was implemented and the results were given in Table 3.

Table 3. ANOVA analysis related to the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation

Sum of Squares	sd	Mean of Squares	F	p
5688.41	7	812.63	31.37	.00**
19145.89	743	25.91		
24834.29	750			

**Significant at p<.001 level

According to the analysis in Table 3, it was seen that independent variables when used together predicted amotivation significantly [F (7; 743) = 31.37, p < .001). In Table 3, the findings concerning of predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation were given.

Table 4. The findings concerning the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation.

Dependent variable	R	R^2	Adjusted R^2	Standard error of estimate
Amotivation	.479	.229	.222	5.111

Independent variables (Constant), Belief on effort, Belief on ability, Belief on one truth, Deep learning, Superficial learning, Strategic learning and Problem solving skills

Seen in Table 4, all independent variables used together there is a significant correlation between them at the level of p < .001 (R = .479, p <. 001). The predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation was figured as .222 (adjusted R^2). As a result, %22.2 of university students' amotivation was explained with their epistemological beliefs, learning strategies and problem solving skills. Regression coefficients and their level of significance were given in Table 5.

Table 5. Multiple regression analysis of the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation.

Scale	Independent Variable(s)	B	Std. Er.	Beta	t	p
	Constant	8.54	2.49		3.44	.00*
EBS	Belief on Effort	-.12	.03	-.16	-4.32	.00**
	Belief on Ability	.15	.04	.15	3.91	.00**
	Belief on One Truth	-.04	.04	-.05	-1.22	.22
LSS	Deep Learning	.02	.02	.04	1.10	.27
	Superficial Learning	-.09	.02	-.22	-6.07	.00**
	Strategic Learning	.17	.02	.36	9.98	.00**
PSSS	Problem Solving Skills Total Score	.01	.01	.03	.85	.397

Dependent Variable: Amotivation
*p<.05 significant level. **p<.001 significant level

When viewed in Table 5, there is a significant correlation between amotivation and belief on effort, belief on ability, superficial learning and strategic learning, but no significant correlation between amotivation and belief on one truth, deep learning and problem solving skills. In other words, belief on one truth, deep learning and problem solving skills had no contribution to the prediction on amotivation. Using the findings in Table 4, amotivation of university students can be formulated as below.

Amotivation = 8.54 (constant) - .12 (belief on effort) + .15 (belief on ability) – .04 (belief on one truth) + .02 (deep learning) – .09 (superficial learning) + .17 (strategic learning) + .01 (problem solving skills).

This revealed that the most effective variable on amotivation was strategic learning. It was respectively followed by belief on ability, belief on effort, deep learning and superficial learning.

Predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on extrinsic motivation

The second sub-question of the study was what predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on extrinsic motivation was. For this reason, multiple regression analysis to predict extrinsic motivation was implemented and the results were given in Table 6, 7 and 8.

Table 6: Multiple Regression Analysis of the Predictive power of University Students' Epistemological Beliefs, Learning Strategies and Problem Solving Skills on Extrinsic Motivation.

Sum of Squares	sd	Mean of Squares	*F*	*p*
29863.46	7	4266.21	36.96	.00**
85423.92	743	115.44		
115287.39	750			

**Significant at p<.001 level

In terms of the analysis seen in Table 6, using independent variables together they could predict extrinsic motivation significantly [*F* (7; 743) = 36.96, *p* < .001). There are the findings concerning university students' epistemological beliefs, learning strategies and problem solving skills on extrinsic motivation in Table 7.

Table 7: The Findings Concerning The Predictive Power of University Students' Epistemological Beliefs, Learning Strategies and Problem Solving Skills on Extrinsic Motivation.

Dependent variable	*R*	R^2	Adjusted R^2	Standard error of estimate
Extrinsic Motivation	.50	.259	.252	10.74

Independent variables (Constant), Belief on effort, Belief on ability, Belief on one truth, Deep learning, Superficial learning, Strategic learning and Problem solving skills

Given in Table 7, all independent variables used together, a significant correlation was found between them at the level of *p* < .001 (*R* = .51, *p* < .001). The predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on extrinsic motivation was figured as .252 (adjusted R^2). As a result, %25.2 of university students' extrinsic motivation was explained with their epistemological beliefs, learning strategies and problem solving skills. Regression coefficients and their level of significance were given in Table 8.

Table 8: Multiple Regression Analysis of the Predictive Power of University Students' Epistemological Beliefs, Learning Strategies and Problem Solving Skills on Extrinsic Motivation

Scale	Independent Variable(s)	*B*	*Std. Er.*	*Beta*	*t*	*p*
	Constant	7.70	5.25		1.47	.14
EBS	Belief on Effort	.31	.06	.19	5.44	.00**
	Belief on Ability	.01	.08	.01	0.13	.89
	Belief on One Truth	.22	.07	.11	2.99	.00*
LSS	Deep Learning	-.06	.04	-.06	-1.53	.12
	Superficial Learning	.37	.03	.41	11.71	.00**
	Strategic Learning	.01	.04	.01	.26	.79
PSSS	Problem Solving Skills Total Score	.03	.03	.04	1.24	.21

Dependent Variable: Extrinsic motivation
*p<.05 significant level. **p<.001 significant level

Seen in Table 8, there is a significant correlation between extrinsic motivation and belief on effort, belief on one truth, and superficial learning, but no significant correlation between extrinsic motivation and

the rest of other independent variables. That is to say, only belief on effort, belief on one truth and superficial learning had contribution to the prediction on extrinsic motivation. Using the findings in Table 8, extrinsic motivation of university students can be formulated as below.

Extrinsic motivation = 7.70 (constant) + .31 (belief on effort) + .01 (belief on ability) + .22 (belief on one truth) - .06 (deep learning) + .37 (superficial learning) + .01 (strategic learning) + .03 (problem solving skills). According to coefficients in Table 8, the most effective variable on extrinsic motivation was superficial learning. It was respectively followed by belief on effort and belief on one truth.

Predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation

The third sub-question of the study was what the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation was. The results of multiple regression analysis to predict intrinsic motivation were given in Table 9, 10, 11.

Table 9: Multiple regression analysis of the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation

Sum of Squares	sd	Mean of Squares	F	p
36116,59	7	5159.51	41.53	.00**
91945,97	743	124.25		
128062,57	750			

**Significant at p<.001 level

Seeing the analysis in Table 9, using independent variables together they predict intrinsic motivation significantly [F (7; 743) = 41.53, p < .001). The findings concerning university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation were given in Table 10.

Table 10: The findings concerning the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation

Dependent variable	R	R^2	Adjusted R^2	Standard error of estimate
Intrinsic Motivation	.531	.282	.275	11.147

Independent variables (Constant), Belief on effort, Belief on ability, Belief on one truth, Deep learning, Superficial learning, Strategic learning and Problem solving skills

Seen in Table 10, all independent variables used together, a significant correlation was found between them at the level of p < .001 (R = .53, p < .001). The predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation was figured as .275 (adjusted R^2). As a result, %27.5 of university students' intrinsic motivation was explained with their epistemological beliefs, learning strategies and problem solving skills. Regression coefficients and their level of significance were given in Table 11.

Table 11: Multiple Regression Analysis of the Predictive Power of University Students' Epistemological Beliefs, Learning Strategies and Problem Solving Skills on Intrinsic Motivation

Scale	Independent Variable(s)	B	Std. Er.	Beta	t	p
	Constant	2.18	5.44		.40	.68
EBS	Belief on Effort	.32	.06	.19	5.49	.00**
	Belief on Ability	.04	.08	.02	0.47	.63
	Belief on One Truth	.19	.08	.09	2.48	.01*
LSS	Deep Learning	.21	.04	.20	5.51	.00**
	Superficial Learning	.25	.03	.26	7.46	.00**
	Strategic Learning	-.22	.04	-.20	-5.76	.00**
PSSS	Problem Solving Skills Total Score	.01	.03	.01	-0.03	.97

Dependent Variable: Intrinsic motivation

*p<.05 significant level. **p<.001 significant level

As given in Table 11, it was found a significant correlation between intrinsic motivation and belief on effort, belief on one truth, deep learning, superficial learning and strategic learning, but no significant correlation between extrinsic motivation and belief on ability and problem solving skills. In other words, belief on ability and problem solving skills had no contribution to the prediction on intrinsic motivation. In terms of the findings in Table 11, intrinsic motivation of university students can be formulated as below.

Intrinsic motivation = 2.18 (constant) + .32 (belief on effort) + .04 (belief on ability) + .19 (belief on one truth) + .21 (deep learning) + .25 (superficial learning) - .22 (strategic learning) + .01 (problem solving skills). According to coefficients in Table 11, the most effective variable on intrinsic motivation was belief on effort. It was respectively followed by superficial learning, strategic learning, deep learning and belief on one truth.

Discussion, Conclusions and Recommendations

This study aimed to find out the predictive power of university students' academic motivation through epistemological beliefs, learning strategies and problem solving skills. Therefore, in this section the correlations among the variables of the study and the findings of their predictive powers of academic motivation are discussed in the light of the literature. Comments are formed according to the sub questions of the study.

Firstly, the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on amotivation was discussed. In terms of findings, the following results were obtained:

- a significant correlation when using all independent variables together,
- a negative significant correlation between amotivation and belief on effort, but a positive significant correlation between amotivation and belief on ability,
- a negative significant correlation between amotivation and superficial learning, but a positive significant correlation between amotivation and strategic learning,
- no significant correlation between amotivation and problem solving skills,
- significant predictive power of university students' epistemological beliefs and learning strategies on amotivation,
- the most effective variable on amotivation was strategic learning which was respectively followed by belief on ability, belief on effort, deep learning and superficial learning,
- %22.2 of university students' amotivation was explained with their epistemological beliefs, learning strategies and problem solving skills.

The findings of the predictive power of epistemological beliefs on amotivation in this study indicates that the university students' belief on effort increases, their amotivation level decreases and their belief on ability increases, their amotivation level increases as well. These findings of this study are in line with the literature on this subject (Schommer-Aikins, 2004). The following research also support the findings of this study as the students, thinking of learning is an innate ability, acted learned helplessness and low resistance (Shell & Husman, 2008), but the students, thinking of intelligence can be improved, made effort during difficult academic tasks (Shell & Husman, 2008); the students, succeeding in Maths, believed in they were born with innate ability (Schoenfeld, 1983); the students, thinking of learning ability is not an innate ability, had high academic performance (Schommer-Aikins et al., 2004); the students, believed in learning needs effort and time, have high academic motivation (Braten & Olaussen, 2004); the thoughts of ability improvement had direct and indirect effects on motivational factors (Chen & Pajares, 2010). The findings of the predictive power of learning strategies on amotivation in this study indicate that the more university students use superficial learning strategies, their amotivation level decreases, and the more they use strategic learning strategies, their amotivation level increases, too. Although there is not enough research showing the correlation or predictive power of learning strategies with or of amotivation, the results supporting the positive correlation between learning strategies and intrinsic and extrinsic motivation were reached (Elliot et al., 1999; Entwistle & Wilson, 1977; Liddle, 2000; Pintrich, 1999; Pintrich & De Groot, 1990). The findings of the predictive power of problem solving skills on amotivation in this study indicate that there is no

significant correlation regarding the predictive power of problem solving skills on amotivation. This finding is not parallel with the previous studies on this subject in the literature. The research carried out by Baker (2003) showed that problem solving skills had negative significant correlation with amotivation and they were important predictive power of academic performance. In the framework of Self-determination Theory, Deci and Ryan (1985, 1991) emphasized that the students having low perception about problem solving skills were amotivated. Besides, the results of some research concerning the avoidance of problem solving had correlation with lack of deciding and evading responsibility (Maydeu-Olivares & D'Zurilla, 1996; Heppner et al., 1982; Vallerand & Bissonnette, 1992), boredom and tiredness (Elliot, 1999), desocilization (D'Zurilla & Chang, 1995) which are all the behaviours describing amotivation.

Secondly, the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on extrinsic motivation was discussed. Regarding the findings, the following results were given:

- a significant correlation when using all independent variables together,

- a positive significant correlation between extrinsic motivation and belief on effort and belief on one truth,

- a positive significant correlation between extrinsic motivation and superficial learning,

- no significant correlation between extrinsic motivation and problem solving skills,

- significant predictive power of university students' epistemological beliefs and learning strategies on extrinsic motivation,

- the most effective variable on extrinsic motivation was superficial learning which was respectively followed by belief on effort and belief on one truth,

- %25 of university students' extrinsic motivation was explained with their epistemological beliefs, learning strategies and problem solving skills.

The findings of the predictive power of epistemological beliefs on extrinsic motivation in this study shows that the more the university students' belief on effort and beliefs on one truth increases, the more their extrinsic motivation level increases as well. There are some researches in line with the result of this study, but also some other researches do not support it. The previous researches revealed that the beliefs of students on one truth had close relation with achievement motivation (Buehl, 2003) performance objectives focusing on extrinsic motivation (Cavallo et al., 2004; Paulsen & Feldman, 2005), and negative correlation with self-efficacy which is the predictor of extrinsic motivation (Schommer & Aikins, 2002). However, there are also some researches results contrary to the findings of this study. Some previous researches showed that the students believed on one truth had lower motivation (Buehl & Alexander, 2005; Hofer, 2000; Schommer, 1990) and had low school success (Trautwein & Lüdtke, 2006). The findings obtained about the predictive power of learning strategies on extrinsic motivation in this study indicates that the more university students use superficial learning strategies, the more their extrinsic motivation level increases. This finding is supported by the results of previous research in literature (Walker et al., 2006; Simons et al., 2004; Entwistle & Wilson, 1977; Moneta & Spada, 2009; Heikkila & Lonka, 2006). Moreover, there are also studies supporting the relation of superficial learning strategies with the components of extrinsic motivation such as extrinsic objective orientation (Entwistle et al., 2002; Harris, 2004), extrinsic controlled motivation (Deci & Ryan, 2000), feeling stress while doing an activity (Baeten et al., 2009), motivation of keeping out of a mistake (Diseth & Martinsen, 2003) and avoiding performance (Cano & Berbén, 2009). The findings of the predictive power of problem solving skills on extrinsic motivation in this study indicates that there is no significant correlation regarding the predictive power of problem solving skills on extrinsic motivation. This finding is not in line with the previous studies on this subject in the literature. The students having performance orientation which is the product of extrinsic motivation had lower problem solving skills (Mecce et al., 1988). According to Baker (2003), problem solving skills were the strong predictors of academic performance and motivational orientation (amotivation and extrinsic motivation). Also, the research conducted by Heppner (1982) supported the correlation between extrinsic motivation and confidence of problem solving.

Lastly, the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on intrinsic motivation was discussed. Concerning the findings, the following results were given:

- a significant correlation when using all independent variables together,

- a positive significant correlation between intrinsic motivation and belief on effort and belief on one truth,

- a positive significant correlation between intrinsic motivation and deep and superficial learning, but negative significant correlation with strategic learning,

- no significant correlation between intrinsic motivation and problem solving skills,

- significant predictive power of university students' epistemological beliefs and learning strategies on intrinsic motivation,

- the most effective variable on intrinsic motivation was belief on effort which was respectively followed by superficial learning, strategic learning, deep learning and belief on one truth,

- %27 of university students' intrinsic motivation was explained with their epistemological beliefs, learning strategies and problem solving skills.

This study's findings about the predictive power of epistemological beliefs on intrinsic motivation indicate that when university students' beliefs on effort and beliefs on one truth increase, their intrinsic motivation level increases as well. There are some researches supporting the predictive power of beliefs on effort on intrinsic motivation. Epistemological beliefs encouraged individual objectives as learning which supports intrinsic motivation and had positive effect on intrinsic motivation (Pintrich & Zusho, 2002; Schommer-Aikins, 2004; Buehl, 2003; Paulsen & Feldman, 2005). In the literature, the researches, which were not in line with that belief on one truth predicted intrinsic motivation, were found. These findings are as follows; the students believed on one truth had lower motivation and performance (Buehl & Alexandre, 2005; Hofer, 2000; Schommer, 1990). Trautwein and Lüdtke (2006) claimed that as the students believed on one truth their school success got lower. The findings about the predictive power of learning strategies on intrinsic motivation in this study indicates that the more university students use deep and superficial learning strategies, the more their intrinsic motivation level increases, but unlike this if university students use strategic learning strategies, their intrinsic motivation level decreases. This finding is parallel with the results of some previous research in literature. The researchers, who firstly investigated the relation between motivation and learning strategies, determined the correlation between intrinsic motivation and deep learning strategy (Deci & Ryan, 1985, 2000; Entwistle & Wilson, 1977; Lee et al., 2010; Linnenink & Pintrich, 2003; Vosloo et al., 2009). In Bigg's view deep learning strategy depended on intrinsic motivation (1987). The research, analyzing the relation of learning strategies with motivation, supported the correlation between deep learning strategy and intrinsic objective orientation (Harris, 2004; Thomas & Gadbois, 2007), autonomy motivation (Deci & Ryan, 2000), self-efficacy (Hoy, 2004), achievement orientation (Diseth & Martinsen, 2003), work motivation (Wilson, 2009). The findings of the predictive power of problem solving skills on intrinsic motivation in this study indicates that there is no significant correlation regarding the predictive power of problem solving skills on intrinsic motivation. The findings above contradict with the results of the previous researches in the literature. Problem solving skills had relation with the variables affecting on intrinsic motivation such as high academic behaviours and performance (Baker, 2003), academic success (Fergusson, 2003), learning objective orientation (Song & Grabowski, 2006; Stone, 2000), self-efficacy (Pintrich, 2000; Pintrich & De Groot, 1990; Noordzij & Te Lindert, 2010; Martin, 2008).

This section of the study reveals the results and recommendations which were obtained according to the findings. In this research, in which the predictive power of university students' epistemological beliefs, learning strategies and problem solving skills on academic motivation, the following results were found.

Epistemological beliefs and learning strategies which were predictive variable explained one fourth of amotivation which was a predicted variable, in other words, nearly one forth of amotivation was formed based on belief on effort, belief on ability, superficial learning and strategic learning, and for the rest of unexplained amotivation it could be concluded that other variables were needed. The most effective variable

on amotivation was strategic learning which was respectively followed by belief on ability, belief on effort, deep learning and superficial learning. Moreover, epistemological beliefs and learning strategies which were predictive variable explained one fourth of extrinsic motivation which was a predicted variable, in other words, nearly one forth of extrinsic motivation was formed based on belief on effort and belief on one truth and superficial learning, and for the rest of unexplained extrinsic motivation it could be concluded that other variables were needed. The most effective variable on extrinsic motivation was superficial learning which was respectively followed by belief on effort and belief on one truth. Lastly, epistemological beliefs and learning strategies which were predictive variable explained nearly one fourth of intrinsic motivation which was a predicted variable, that's to say, one forth of intrinsic motivation was formed based on belief on effort and belief on one truth, superficial learning, strategic learning and deep learning and for the rest of unexplained intrinsic motivation it could be concluded that other variables were needed. The most effective variable on intrinsic motivation was belief on effort which was respectively followed by superficial learning, strategic learning, deep learning and belief on one truth.

All these findings considered, it would be a good idea to give some recommendations for educators, researchers and teachers. In this research, epistemological beliefs, learning strategies and problem solving skills were taken into consideration as predictives of academic motivation. For the following researches, in the light of literature on academic motivation some other variables thought of predictive power on academic motivation can be tested and analyzed. Academic motivation is not only the predictive of university but also it can be the predictor of academic performance and motivation at lower level schools. That's why, similar researches should be carried out at primary, secondary and high schools and the results of which could be compared with each other. In addition, this research could be renewed at different universities and cultures with larger sample groups. To be able to determine the differentiation level of the findings obtained from this research according to the field, it might be applied as domain-specific such as English, Math or etc. The same research could be done again concerning the sub factors of intrinsic and extrinsic motivation so the more detailed results could be reached. Because belief on effort and deep learning strategy are the most powerful predictor on academic motivation and performance, guidance services at schools and universities should focus on the improvement of these factors for students. In terms of the findings of this research, intrinsic motivation is seen as the most important factor for academic performance. The fact that teachers and guidance experts try to improve students' sel-efficacy and self-regulation which have positive effect on intrinsic motivation will possibly increase students' academic motivation.

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