The effect of Turkish students' motivational beliefs on their metacognitive self-regulation in Physics

Deniz GÜRÇAY*

Hacettepe University, Department of Secondary School Science and Mathematics Education, Beytepe-Ankara, TURKEY

E-mail: denizg@hacettepe.edu.tr

Ebru BALTA

Sel_uk University, Department of Secondary School Science and Mathematics Education, TURKEY

E-mail: ebrubalta@selcuk.edu.tr

Received 21 Dec., 2012
Revised 6 Sept., 2013

Contents

Abstract

It is emphasized in several studies that both domain specific factors and cultural values and beliefs could have an effect on students' metacognitive self-regulation and motivational beliefs. The aim of this study was to investigate the effect of motivational beliefs on Turkish students' metacognitive self-regulation in physics courses. Therefore, the contribution of the students' learning goal, performance goal, and self-efficacy beliefs in physics on their metacognitive self-regulation in physics was investigated. 187 Turkish preservice teachers taking introductory physics course participated in this study. In order to assess students' use of metacognitive strategy in physics, metacognitive self-regulation subscale of Motivated Strategies for Learning Questionnaire was used. The students were requested to consider the strategies they used in relation to the physics course they took. The subscales of the Achievement Motivation Questionnaire were used to assess students' learning goals, performance goals, and the self-efficacy in physics course. The results of the study were evaluated by using SPSS with the help of descriptive statistics and stepwise multiple regression analysis. The results showed that students' metacognitive self-regulation in physics scores was high and besides; their scores for learning goals were higher than those for performance goals. Moreover, stepwise multiple regression analysis revealed that learning goals and physics self-efficacy were significant predictors of students' metacognitive self-regulation in physics scores explaining 33% of the variance.

Keywords: achievement motivation, metacognition, self-efficacy, self regulation

Introduction

Today, the studies conducted in the field of science education on the one hand focus on the investigation of the factors that affect the achievement of students and on the other hand, the effects of motivational and cognitive variables on learning are also studied. One of the important constructs that are effective on learning is metacognition (Pintrich, 2002). Today, the most commonly used definition of metacognition is “thinking about thinking” (Livingston, 2003). Research on metacognition started in the 1970s with the studies on meta-processes by Flavell. Later on, Flavell conducted studies on the aspects of how an individual monitors or thinks about his or her own cognition (Dinsmore, Alexander & Loughlin, 2008). Metacognition is generally viewed from two different aspects as the knowledge about cognition and the regulation of cognition (Flavell, 1979, Veenman, Van Hout & Afflerbach, 2006). Knowledge about cognition involves what a student knows about his own cognition or about cognition in general and that student's awareness of this knowledge (Schraw & Moshman, 1995; Pintrich, 2002). Self-regulation of cognition emphasizes an individual's monitoring of his learning processes.

Self-regulation, which is thought to be a construct that is effective on the achievements and academic performances of individuals, refers to the effectiveness of the individual on his or her own learning processes. The concept of self-regulation has been tried to be explained through various models and definitions (Boekaerts, 1996; Pintrich, 2000b; Zimmerman, 1998). Pintrich (2000b, p.453) defines the concept of self-regulation as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment". According to Zimmerman (1989, p.4) self-regulated learners defined as "metacognitively, motivationally, and behaviorally active participants in their own learning". In terms of metacognition, self-regulation implies the learners' making plans regarding their goals, self-monitoring, and self-evaluating their learning processes (Zimmerman, 1990). In terms of behavioral processes, learners select environments for an optimum learning (Zimmerman, 1990). In terms of motivational processes, self-regulation implies the learners' desire to realize their goals (Zimmerman, 1990). Although there are some differences among various models on self-regulated learning, Vrugt and Oort (2008, p.124) indicated that "there is consensus among researchers that self-regulated learning involves goal setting, metacognition, and the use of (meta)cognitive strategies". Furthermore, it is emphasized in various models that self-regulated learning involves goals and self-regulatory processes are used in achieving these goals (Zimmerman, 2000). Besides, all learners use self-regulation strategies more or less and it would be wrong to speak of a lack of self-regulation in individuals (Winne, 1997).

Pintrich (1999) classifies the strategies that can be used in self-regulated learning into three categories as cognitive learning strategies, metacognitive learning strategies, and resource management strategies. Cognitive processes that are used for attaining a goal regarding the learning subject, e.g., they maintain the recall of a piece of information as simple memory information or its comprehension, which is a more complex task are related to cognitive strategies (Leopold, den Elzen-Rump & Leutner 2007). Metacognitive strategies are those that involve the control and regulation of a learner's cognitive strategies. Numerous metacognitive strategy models include planning, monitoring, and regulating strategies. These are indicated as strategies that are necessary for self-regulated learning (Pintrich & De Groot, 1990, Pintrich, 1999). Planning strategies comprise setting a goal for studying and the analysis of the study material. Monitoring strategies involve assessing and judging one's own understanding while reading a text or listening to a speech. However, regulating strategies are those that enable the learner to perform fine-tunings and adjustments between one's learning goals and current performance through monitoring oneself (Pintrich, 1999). Moreover, learners use resource management strategies to manage and control their environments as well as to perform necessary changes in their environments to fit their goals and needs (Pintrich, 1999).

Studies on achievement motivation have focused on two types of motivational approaches: learning goal orientation and performance goal orientation (Dweck & Elliot 1983). Learning goal orientation is motivation towards learning a new thing and trying to understand a topic, namely, it aims at developing the competence of a learner. On the contrary, performance goal orientation focuses on motivation to demonstrate own abilities and performances like getting high grades or being praised by others, being more successful than the other students (Pintrich, 2000a). On the other side, self-efficacy belief is based on individuals' beliefs on their abilities and it is necessary for organizing and elucidating essential behavior for achieving the goal. Bandura (1997, p.3.) defined self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments". Moreover, highly self-efficacious persons tended to make more effort in a task (Palmer, 2011).

The relationships between metacognition and motivational factors were investigated in several studies (Coutinho, 2007; Ford, Smith, Weissbein, Gully, & Salas, 1998; Pintrich & DeGroot, 1990, Vrugt & Oort, 2008). Similarly, some research studies focused on the investigation of the effects of goal orientation and self- efficacy on learning (Pajares, 1996; Pintrich & DeGroot, 1990; Pintrich & Schunk, 2002; Wigfield & Eccles, 2000). Pintrich (1999) examined the relationships among the self-efficacy, task value beliefs and goal orientations dimensions of motivational beliefs and self-regulatory strategy use in middle school and college contexts. A relationship was found between self-efficacy and self-regulatory strategy use in both samples. Furthermore, it was emphasized that there was a relationship between task value beliefs and self-regulatory strategy use. Besides, Pintrich (1999) stated that learning goal orientation was a better determinant of self-regulated learning compared to performance goal orientation. Kahraman and Sungur (2011) investigated the relationship between students' perceptions of self-efficacy and achievement goals and their metacognitive strategy use in science. The results of their study showed that self-efficacious students who studied science in order to learn and understand it tended to use metacognitive self regulation strategies more. In certain studies, a significant relationship was found between metacognitive strategy use and mastery goal orientation (Couintho, 2007, Middlebrooks, 1996).

There are many research conducted in Western countries (Kahraman & Sungur, 2011). A review of the literature shows that there are very few studies on the metacognitive self-regulation in Turkey. In addition, although there are several studies on the metacognitive strategy use in different domains, we could not find any studies on the metacognitive strategy use in learning physics. It is stressed that since both domain specific factors and cultural values and beliefs could be effective on the students' metacognitive self-regulation and motivational beliefs, studies should be conducted in this field (Veenman, Van Hout-wolters, & Afflerbach, 2006). Furthermore, it is important to investigate the relationship between metacognitive self-regulation and goal orientation in the domain of physics, which is perceived by students to be difficult and abstract (Angell, Guttersrud, Henriksen & Isnes, 2004), in terms of the contribution of domain specific results to the theoretical basis of the field. It is emphasized in some studies that the grade levels of students could have an effect on their goal orientations and these orientations might guide the student to focus on different skills (Abd-El-Fattah & Patrick 2011). Considering the studies in the literature, it is thought that the investigation of to what extent students' motivational beliefs affect their use of metacognitive strategies when learning physics will contribute to the studies in this field. The purpose of this study is to investigate the effect of introductory physics course students' goal orientations in physics (learning goal and performance goal) and physics self-efficacy beliefs on their metacognitive strategy use in physics.

Method

Participants

The study was carried out with 187 Turkish preservice teachers taking an introductory physics course. Of the introductory physics course students who participated in the study, 36 were from the department of mathematics education, 26 were from the department of chemistry education, 28 were from the department of biology education, 44 were from the department of elementary science education and 53 were from the department of elementary mathematics education. Fifty two percent of the preservice teachers took physics classes in their first year and the rest of the preservice teachers took physics classes in their second year. 77% of the participants were females. The mean age was 20.

Data Collection Tools

Metacognitive Self-Regulation in Physics Scale (MSRP)

In the study, the self-regulation subscale of the metacognitive strategies scale of the Motivated Strategies for Learning Questionnaire, which was developed by Pintrich, Smith, Garcia and McKeachie (1991), was used in order to determine the introductory physics course students' motivation and learning strategies. MSRP is a seven point Likert type scale ranging from "not at all true of me" to "very true of me". The minimum and maximum scores that a student could receive from this 12 item scale varied between 12 and 84. The Cronbach alpha reliability coefficient of the metacognitive self-regulation subscale of the original scale was $\alpha = .79$. A sample item from the scale is: "When I study for this physics course, I set goals for myself in order to direct my activities in each study period."

This scale adapted into Turkish by Sungur (2004). Sungur reported adapted version of this instrument as valid and reliable instrument (Sungur, 2004). The Cronbach alpha reliability coefficient of the adapted scale was found to be $\alpha = .81$ (Sungur, 2004). In the present study, the Cronbach alpha reliability coefficient of the MSRP was calculated as $\alpha = .79$

Achievement Motivation in Physics Scale (AMP)

The Achievement Motivation Scale, which was developed by Cavallo, Rozman and Potter (2004), was used in order to determine the introductory physics course students' achievement goals and self-efficacies in physics. The achievement motivation scale in physics, which consists of 14 items, has 3 subscales: the Learning Goal subscale (LG) consisting of 5 items mainly reflects the desire of the individual to learn, the Performance Goal subscale (PG) consisting of 5 items mainly reflects the desire of the individual to get a high mark and the Self-Efficacy Belief subscale (SE) consisting of 4 items reflect the individual's belief regarding his or her own ability to succeed in learning physics. The scale is a four point Likert type ranging from "I strongly agree" to "I strongly disagree". The minimum and maximum scores that a student could receive from the scale vary between 5 and 20 for the learning goal and performance goal subscales and between 4 and 16 for the self-efficacy subscale. The Cronbach alpha reliability coefficients of the scale were α= .94 for the learning goal subscale, α= .82 for the performance goal subscale and α= . 89 for the self-efficacy subscale. Sample items from the learning goal, performance goal and self-efficacy belief subscales of the scale are as follows respectively: "One of my primary goals in this class is to understand the science activities that we do", "One of my primary goals in this class is to get a good grade, even if I don't learn anything new", "I am confident I can do well on the physics problems we are given in this class". The adaptation of the achievement motivation scale into Turkish was performed by Çalışkan (2003). The Cronbach alpha reliability coefficients of the scale adapted into Turkish are α= .79 for the learning goal subscale, α= .70 for the performance goal subscale, and α= . 60 for the self-efficacy subscale.

In the present study, the Cronbach alpha reliability coefficients were calculated as α= .78 for the learning goal subscale, α= .59 for the performance goal subscale, and α= . 62 for the self-efficacy subscale.

Results

Descriptive statistics was used to determine the introductory physics course students' metacognitive self-regulation, learning goal, performance goal, and self-efficacy belief levels in physics. Mean, standard deviation, kurtosis, and skewness values regarding these scales are given in Table 1. It was determined that the students' mean scores of the metacognitive self-regulation, learning goal orientation, and self-efficacy belief in physics were high, but their performance goal orientation was at a moderate level.

Table 1. Descriptive Statistics

	MSRP	LG	PG	SE
Mean	4.89	3.01	2.30	3.26
Std.Dev.	11.91	2.94	2.99	2.33
Skewness	-.41	-.63	-.74	.10
Kurtosis	-.51	-.26	.25	-.56
N	187	187	187	187

The results of the Pearson correlation analysis conducted among the metacognitive self-regulation, learning goal, performance goal, and self-efficacy belief in physics are presented in Table 2. The results of the correlation analysis revealed a moderate, positive and significant correlation between use of metacognitive self-regulation in physics and learning goal orientation and a low, positive, and significant correlation between the use of metacognitive self-regulation in physics and physics self-efficacy belief. Furthermore, a low, positive, and significant correlation was found between physics self-efficacy belief and learning goal orientation and a low, negative but significant correlation was determined between physics self-efficacy belief and performance goal orientation.

Table 2. Pearson Correlation Analysis

	MSRP	LG	PG
LG	.53**		
PG	.08	.03	
SE	.42**	.37**	.15**

**Correlation is significant at the 0.01 level.

A stepwise multiple regression analysis was performed to examine how well the students' learning goal orientation, performance goal orientation and physics self-efficacy belief predict their metacognitive strategy use in physics. Multiple regression assumptions were tested before conducting the stepwise multiple regression analyses. Accordingly, it was seen that the sample size was sufficient according to the formula: N > 50+8m (Tabachnick & Fidel, 1996) considering the number of independent variables. Since the number of independent variables was two, with 187 > 74 the assumption of sample size adequacy was met. VIF values were also calculated to examine the multicollinearity assumption. It was determined that VIF value was lower than 10. Therefore, there was no violation of this assumption. Besides, an extreme value did not occur and normality and linearity assumptions were met in the study.

According to the results of the stepwise multiple regression analysis (Table 3), the main variable that explained the metacognitive self-regulation in physics was learning goal orientation ($R2= .28$; $F(1, 185) = 69.76$, $p < .05$). When physics self-efficacy was added to the model with learning goal orientation, it was seen that both variables provided significant contribution and the overall model explained the 33 % of the variance of the metacognitive self-regulation in physics ($F(2, 184) = 15.18$, $p < .05$). The direction of the correlation between the metacognitive self-regulation in physics and physics self-efficacy was positive. However, it was seen that performance goal orientation did not predict the metacognitive self-regulation in physics.

Table 3. Stepwise Multiple Regression Analyses for the Use of Metacognitive Self-Regulation

Model	B	Std.Error.	Beta	t	Sig.	Collinearity Statistics VIF
1 (Constant)	26.757	3.898		6.874	.000	
Learning goal	2.118	0.254	0.523	8.352	.000	1.000
2 (Constant)	15.583	4.722		3.300	.001	
Learning goal	1.737	0.263	0.429	6.594	.000	1.161
Self-efficacy	1.295	0.333	0.253	3.896	.001	1.161

Dependent Variable: Metacognitive self-regulation

Conclusion, Discussion & Suggestions

The main purpose of the present study was to determine the Turkish introductory physics course students' metacognitive self-regulation in physics, learning and performance goal orientations and physics self-efficacy levels. Besides, the effects of students' goal orientations and physics self-efficacy scores on their metacognitive self-regulation in physics were also investigated.

The results of the study shows that students taking introductory physics have high level use of metacognitive strategy in physics, learning goal orientations, and physics self-efficacy beliefs. However, their performance goal orientations were found to be at a moderate level. Students' high metacognitive self-regulation in physics levels reflect that they use strategies to control and regulate their cognitive processes, i.e. they plan, monitor, and review their own learning processes and make an effort where needed. The high learning goal orientation level of students taking introductory physics course shows that these students have a high level of desire to learn. Similarly, the high physics self-efficacy belief levels of the students show that they have high beliefs in that they can successfully accomplish the task or problem regarding the physics topic to be learned no matter how difficult it is. However, the moderate level of these students' performance goal orientations shows that their desire to get high grades in physics classes is at a moderate level.

Another result of the study revealed that there was a moderate, positive, and significant correlation between introductory physics students' use of metacognitive self-regulation in physics and learning goal orientation and a low, positive, and significant correlation between the use of metacognitive self-regulation in physics and physics self-efficacy belief. Similarly, in several studies positive correlations were found between learning goal orientation and use of metacognitive strategies (Somuncuoglu & Yildirim, 1999, Sungur, 2007). Pajares and Shunk (2001) stated that metacognitive self-regulation was a construct related to self-efficacy belief. These studies support the results of the present study.

Furthermore, a low, positive, and significant correlation was found between physics self-efficacy belief and learning goal orientation and a low, negative but significant correlation was determined between physics self-efficacy belief and performance goal orientation. This result shows that students whose goal is only to learn physics rather than to be praised by others or to be more successful will also have a high belief in that they can successfully accomplish a physics task or problem no matter how difficult it is. Similarly, it was stated in several studies that learning goal orientation has a positive relationship with self-efficacy and perception of academic ability (Wolters, 2004; Midgley et al. 1998).

According to the results of the stepwise regression analysis conducted in this study, it was determined that learning goal orientation and physics self-efficacy had a significant effect on Turkish introductory physics students' metacognitive self-regulation in physics. Schunk (1995) reported that goals related to learning are effective on self-efficacy and self-regulation, but on the other hand performance goals could also create strong motivational effects. Coutinho (2007) found that metacognitive strategy use had a high correlation with learning goal orientation but a low correlation with performance goal orientation and also emphasized that according to the result of the regression analysis, learning goal orientation was an effective factor on metacognition whereas performance goal orientation was not found to be effective. Furthermore, Coutinho (2008) stated that students who effectively used metacognitive strategies would also have high beliefs in that they can successfully accomplish a task. These results show that students can better metacognitivelly self-regulate their own learning in introductory physics classes when they focus on learning and understanding physics and developing their own competence in physics rather than focusing on getting high grades and being praised by their peers or environment. For this reason, it is suggested that instructors who teach these courses should create more interactive and learning oriented environments where the active participation of students is maintained through methodologies like cooperative learning and peer interaction. For this purpose, instructors can include more research assignments and projects in their courses and encourage students to participate in activities like physics groups, seminars and symposiums in order that the motivational beliefs of students are more learning oriented. Furthermore, since self-regulation skills are considered to be learnable and improvable (Zimmerman & Schunk 2011), academicians can observe the students' perceptions and motivations in their physics classes and provide them with environments in which they can be active in the learning process and assess their own learning (Üredi & Üredi, 2007). Moreover, researchers could conduct developmental studies in order to understand changes in students motivational beliefs and use of metacognitive self regulation strategies.

Reference

Abd-El-Fattah., S., M. & Patrick. R. R. (2011). The relationship among achievement motivation orientations, achievement goals, and academic achievement and interest: A multiple mediation analysis. *Australian Journal of Educational & Developmental Psychology, 11*, 91-110.

Angell C., Guttersrud Ø., Henriksen E.K., & Isnes A. (2004). Physics: frightful, but fun. Pupils' and teachers' views of physics and physics teaching. *Science Education, 88* (5), 683–706.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W.H Freeman & Company.

Boekaerts, M. (1996). Self-regulated learning at the junction of cognition and motivation. *European Pyschologist, 1*(2), 100-112.

Caliskan, I. S. (2003). *The effect of inquiry-based chemistry course on students' understanding of atom concept, learning approaches, motivation, self-efficacy, and epistemological beliefs.* Unpublished master thesis. MiddleEast Technical University, Ankara.

Cavallo, A. M. L., Rozman, M., & Potter, W. H. (2004). Gender differences in learning constructs, shifts in learning constructs, and their relationship to course achievement in a structured inquiry, yearlong college physic course for life science majors. *School Science and Mathematics, 104*(6), 288-301.

Coutinho, S. A. (2007). The relationship between goals, metacognition, and academic success. *Educate Journal, 7*(1), 39-47.

Coutinho, S. (2008). Self-efficacy, metacognition, and performance. *North American Journal of Psychology, 10*(1), 165–172.

Dinsmore, D. L., Alexander, P. A., & Loughlin, S. M. (2008). Focusing the conceptual lens on metacognition, self-regulation, and self-regulated learning. *Educational Psychology Review, 20*(4), 391-409.

Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In P. H. Mussen (Gen. Ed.) & E. M. Hetherington (Vol. Ed.), *Handbook of child psychology. Socialization, personality, and social development* (pp. 643-691). New York: Wiley.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: a new area of cognitive-developmental inquiry. *American Psychologist, 34*(10), 906–911.

Ford, J. K., Smith, E. M., Weissbein, D. A., Gully, S. M., & Salas, E. (1998). Relationships of goal orientation, metacognitive activity and practice strategies with learning outcomes and transfer. *Journal of Applied Psychology, 83*(2), 218–233.

Kahraman, N., & Sungur, S. (2011). The Contribution of Motivational Beliefs to Students' Metacognitive Strategy Use. *Education and Science, 36*(160), 3-10.

Leopold, C., den Elzen-Rump, V., & Leutner, D. (2007). Self-regulated learning from science texts. In M. Prenzel (Ed.), *Studies on the educational quality of schools. The final report on the DFG Priority Programme* (pp. 221–238). Waxmann: Münster.

Livingston, J.A. (2003). Metacognition: An overview. ERIC Document Reproduction Service No. ED474 273. Retrieved September 11, 2012, from http://people.ucsc.edu/~gwells/Files/Courses_Folder/documents/LivingstonMetacognition.pdf

Middlebrooks, A. (1996). *Effects of goal orientation on metacognitive activity*. Paper presented at the Annual Meeting of the American Educational Research Association. Newyork, 8-12 April.

Midgley, C., Kaplan. A., Middleton, M., Maehr L. M., Urdan T., Anderman, L. H., Anderman, E., & Roeser, R. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational. Psychology, 23*(2),113–131.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543–578.

Pajares, F., & Schunk, D. H. (2001). Self-beliefs and school success: Self-efficacy, self-concept, and school achievement. In R. Riding & S. Rayner (Eds.), *Self-Perception* (pp. 239-266). London:Ablex Publishing.

Palmer, D. (2011). Sources of efficacy information in an inservice program for elementary teachers. *Science Education, 95* (4), 577–600.

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*, 459–470.

Pintrich, P. R. (2000a). An achievement goal theory perspective on issues in motivation terminology, theory, and research. *Contemporary Educational Psychology, 25*, 92–104.

Pintrich, P. R. (2000b). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner, (Eds.), *Handbook of self-regulation: Theory, research, and applications* (pp. 451-502). San Diego, CA: Academic Press.

Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into practice, 41*(4), 219-225.

Pintrich, P., & De Groot, E. (1990). Motivational and selfregulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40.

Pintrich, P. R., & Schunk, D. (2002). *Motivation in education: Theory, research, and applications* (2nd ed.). N.J: Prentice Hall.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. Ann Arbor, MI: National Centre for Research to Improve Postsecondary Teaching and Learning, The University of Michigan.

Schraw, G., & Moshman, D. (1995). Metacognitive Theories. *Educational Psychology Review, 7*(4), 351-371.

Schunk, D. H. (1995). Self-efficacy, motivation, and performance. *Journal of Applied Sport Psychology, 7*(2), 112-137.

Somuncuoglu, Y., & Yildirim, A. (1999). Relationship between achievement goal orientations and use of learning strategies. *Journal of Educational Research*, *92*(5), 267-277.

Sungur, S. (2004). *The implementation of problem-based learning in secondary school biology courses.* Unpublished Dissertation, Middle East Technical University, Ankara, Turkey.

Sungur, S. (2007). Modeling the relationships among students' motivational beliefs, metacognitive strategy use, and effort regulation. *Scandinavian Journal of Educational Research*, *51*(3), 315–326.

Tabachnick, B. G., & Fidell, L. S. (1996). Using multivariate statistics (3rd ed.). New York:HarperCollins.

Üredi, I. ve Üredi, L. (2007). Öğrencilerin Öz-düzenleme Becerilerini Geliştiren Öğrenme Ortamlarının Oluşturulması. *Edu7*, 2(2).

Veenman, M., Van Hout-Wolters, B., & Afflerbach, P. (2006). Metacognition and learning: Conceptual and methodological considerations. *Metacognition and Learning*, *1*(1), 3-14.

Vrugt, A., & Oort, F. J. (2008). Metacognition, achievement goals, study strategies and academic achievement: Pathways to achievement. *Metacognition and Learning*, *30*(2), 123–146.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25*(1), 68–81.

Winne, P. H. (1997). Experimenting to bootstrap self-regulated learning. *Journal of Educational Psychology*, *89*(3), 397-410.

Wolters C. A. (2004). Advancing achievement goal theory: using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational. Psychology*, *96*(2), 236–250.

Zimmerman, B. J. (1989). Models of self-regulated learning and academic achievement. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 1–26). New York: Springer-Verlag.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, *25*(1), 3-17.

Zimmerman, B. J. (1998). Academic studying and the development of personal skill: A self-regulatory perspective. *Educational Psychologist, 33(2/3), 73–86.*

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, *25*(1), 82-91.

Zimmerman, B. J., & Schunk, D. (2011). *Handbook of selfregulation of learning and performance. New York:Routledge.*tsunami. *World Landslide Forum.* Tokyo.