The role of achievement goal orientations and interest on metacognitive strategy use of preservice science teachers

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ABSTRACT   The purpose of this study was to determine contribution of achievement goal orientations and personal interest on prediction of metacognitive strategy use of preservice science teachers. This study was conducted with three hundred and twenty-two preservice science teachers who are freshmen, sophomore, junior and senior of elementary science education program. Data was collected by using three instruments which are "Metacognitive Self-Regulation Subscale ofMotivated Strategies for Learning Questionnaire", "Achievement Goals Questionnaire" and "The Academic Interest Questionnaire". Data was controlled with respect to reliability and validity. The collected data was analyzed by hierarchical regression. Results of this analysis showed that mastery approach goal orientation predicted significantly metacognitive strategy use of preservice science teacher in science course. On the other hand, mastery avoidance, performance approach, performance avoidance goal orientations and personal interest was not founded to predict significantly to metacognitive strategy use.

Keywords   Achievement goal orientations, personal interest, metacognitive strategy.

ÖZ   Bu çalışmanın amacı, fen bilgisi öğretmen adaylarının başarı hedefi yönelimleri ve kişisel ilgilerinin bilişüstü strateji kullanımını yordamadaki katkısını belirlemektir. Bu çalışma, ilköğretim fen bilgisi eğitimi programında okuyan birinci, ikinci, üçüncü ve dördüncü sınıfta olan toplam 322 fen bilgisi öğretmen adayı ile yürütülmüştür. Veriler, "Öğrenmede Güdüsel Stratejiler Ölçeğinin Bilişüstü Özdüzenleme Alt Ölçeği", "Başarı Hedefleri Anketi" ve "Akademik İlgi Anketi" kullanarak toplanmıştır. Güvenirlik ve geçerlilik açısından, veriler kontrol edilmiştir. Daha sonra, bu veriler hiyerarşik regresyon ile analiz edilmiştir. Araştırma bulguları sonucunda, ustalık-yaklaşım hedef yöneliminin, bilişüstü strateji kullanımını önemli ölçüde istatiksel olarak yordadığı görülmüştür. Bunun yanında, ustalık-kaçınma hedef yöneliminin, başarım-yaklaşım hedef yönelimi, başarım-kaçınma hedef yönelimi ve kişisel ilgilerin bilişüstü strateji kullanımı önemli ölçüde tahmin etmediği bulunmuştur.

Anahtar Sözcükler   Başarı hedef yönelimi, kişisel ilgi, bilişüstü strateji

GENİŞ ÖZET

Öz düzenleyici öğrenme, etkin ve yapıcı bir süreç olup, bu süreçte öğrenenlerin hedef belirlemesi, bu hedeflerin doğrultusunda kendi biliş düzeylerini, motivasyon ve davranışlarını, izlemesi, düzenlemesi ve denetlemesidir (Pintrich, 2000).Kapsamlı öz düzenleme, öğrenenlerin bilişsel, üstbilişsel ve motivasyon stratejilerini kullanması ile mümkün olmaktadır (Leutwyler, 2009).Bunların arasında, üstbilişsel stratejiler üst düzey idari süreçler olup, öğrencilere kendi öğrenme süreçlerini kontrol etmede, planlamada, izlemede ve düzenlemede yardımcı olur (Gall, Gall, Jacobsen, & Bullock, 1990).Üstbilişsel stratejilerin öğrenciler tarafından kullanılması için motive edilmesi gerekmektedir (Pintrich, 1988).

Son yıllarda motivasyon öğesi olan başarı hedef yönelimleri ile yapılan çalışmalar hız kazanmıştır.Başarı hedef yönelimleri, başarılı olmak istemenin nedenleri ve verilen görevlere nasıl yaklaşıldığı ile alakalıdır (Pintrich, 2000).Bu başarı hedef yönelimleri dört gruba ayrılmaktadır.Bunlar Ustalık yaklaşım, ustalık kaçınma, başarım-yaklaşım ve başarım-kaçınma hedef yönelimleridir.Ustalık-yaklaşım hedef yönelimleri ile öğrenmek, bir konuda ustalaşmak yeni beceriler geliştirmek ile alalıdır Diğerlerinin nasıl bir performans sergilediği ile ilgilenmez (Dweck & Leggett, 1988; Maehr & Midgley, 1991; Nicholls, 1984). Bunun yanında, ustalık-kaçınma ise öğrenmeden kaçınma, ya da göstereceğinden daha az çaba sarf etme olarak tanımlanmaktadır (Pintrich & Schunk, 2002). Başarım hedef yönelimleri, ustalık hedef yönelimlerin aksine sosyal karşılaştırmaya önem vermesi ve diğerlerini referans alarak performans göstermesi olarak belirtilir (Dweck & Leggett, 1998; Midgley et al., 1998).Ustalık hedef yönelimleri gibi ikiye ayrılmaktadır.Başarım-kaçınma hedef yönelimlerinde öğrenciler grupta en iyi olmak için mücadele ederken, başarım-kaçınmada yeteneksiz görünmekten kaçınmak için çalışmaktadır (Pintrich & Schunk, 2002). Yapılan çalışmalar ustalık hedef yönelimlerinin derin bilişsel strateji kullanma, göreve ilgi duyma, başarıyı isteme ve zor durumlar karşısında azimli olma gibi değişkenlerle pozitif ilişkili olduğunu gösterirken, başarım hedef yönelimleri yüzeysel bilişsel stratejiler kullanma, gerekli çaba göstermeme gibi değişkenlerle pozitif ilişki rastlanmıştır (Pintrich, 2000; Wolters, Yu & Pintrich, 1996).

Öğrenme süreçlerinin ve sonuçların anlamada kişisel ilgi de önemli bir motivasyon öğesi olarak görülmektedir.Kişisel ilgi bireylerin öğrenme, düşünme ve performanslarına büyük katkı sağlamaktadır (Pintrich & Schunk, 2002).Özellikle, kişisel ilginin, öğrencilerde bilgilerin kalıcılığını sağlamada, görev tamamlamada ve başarıya ulaşmada önemli bir etki yaptığı görülmüştür (Renninger & Hidi, 2002; Singh, Granville & Dika, 2002; Xu, 2008).

Milli Eğitim Bakanlığına (2006) göre fen eğitiminin amacı yaşam boyu öğrenmeyi gerçekleştiren bireyler yetirmektir.Bu bağlamda, öğrencilerin öğrenme sürecinde aktif olması, bilgi alımı ve bilginin yapılandırmasında özdüzenleme becerisinin kazandırılması amaçlanmıştır.Öz düzenleme bir beceri olup, öğretmenler tarafından öğrencilere kazandırılması gerekmektedir.Fakat öğrenciye kazandırmak için öğretmenlerin kendi öğrenme ortamında öz düzenlemeyi tecrübe etmesi gerekmektedir.Dolayısıyla, fen bilgisi öğretmen adaylarının bu öz düzenleme ve öz düzenlemenin boyutları konusunda araştırılması gerekmektedir.

Başarı hedef yönelimi ve kişisel ilgi ile yapılan çalışmalar öğrenme strateji kullanımı ile pozitif bir ilişkide olduğunu göstermiştir.Örneğin, Butler (2007) başarı hedef yönelimlerinin öğrenme için bir çerçeve sunduğunu, öğrenme stratejilerinin öğrenme için geliştirilen hedeflerle yakından ilgili olduğunu söylemiştir. Bunun yanımda, Schiefele (1991) kişisel ilgi ile detaylandırma, eleştirel düşünme gibi derin bilişsel stratejilerin kullanılmasında bir pozitif ilişki olduğunu belirtmiştir.

Alanyazında, öğretmen adaylarının öğrenme stratejileri kullanımının, başarı hedef yönelimleri ve kişisel ilgi ile ilişkisini açıklayan yeterli çalışma yoktur.Öğrencilerde olduğu gibi başarı hedef yönelimleri ve kişisel ilginin öğretmen adaylarının öğrenme stratejilerin kullanımı konusunda bir ilişkisi olabileceği düşünülmektedir.Bu çerçevede, bu çalışmanın amacı fen bilgisi öğretmen adaylarının başarı hedefi yönelimleri ve kişisel ilgilerinin bilişüstü strateji kullanımını yordamadaki katkısını belirlemektir.Bu çalışmaya; öğrenme stratejisi olarak, daha yüksek düzeyde işlemler gerektiren bilişüstü öğrenme stratejileri dahil edilmiştir.

Bu çalışma, ilköğretim fen bilgisi eğitimi programında okuyan 322 fen bilgisi öğretmen adayı ile yürütülmüştür. Bu katılımcıların 96'sı erkek, 226'sı ise kız olup, % 37.3 birinci sınıfta, % 26.5 ikinici, % 24.5 üçüncü sınıfa ve % 11.8 dördüncü sınıfa gitmektedir. Veriler, "Öğrenmede Güdüsel Stratejiler Ölçeğinin, Bilişüstü Özdüzenleme Alt Ölçeği", "Başarı Hedefleri Anketi" ve "Akademik İlgi Anketi"

5

kullanarak toplanmıştır. Bilişüstü özdüzenleme alt ölçeği 12 madde ve bir faktörden oluşan 7'li likert tipi öz bildirime dayalı bir ölçme aracıdır.Başarı hedefler anketi ise 15 madde ve dört faktörden oluşan 5'li bir likert bir yapıya sahipken, akademik ilgi anketi 6 maddeden 5'li likerte dayalı bir ölçektir.Güvenirlik ve geçerlilik açısından, veriler kontrol edilmiştir.Bu veriler hiyerarşik regresyon ile analiz edilmiştir.Regresyon analizine geçmeden önce, varsayımlar kontrol edilmiştir.Normallik, doğrusallık, eşvaryanslılık ve eşdoğrusallık açısından herhangi bir sakınca görülmemiştir.Bu sonuçtan sonra, hiyerarşik regresyon aşamasına geçilmiştir. Yapılan analiz sonucunda, başarı hedef yönelimleri ile kişisel ilgi değişkenlerinin üstbilişsel strateji kullanımının % 33.6' lık kısmını açıkladığı bulunmuştur, $R = .58$, $F (5, 96) = 9.70$, $p < .05$. Ayrıca, ustalık-yaklaşım hedef yöneliminin, bilişüstü strateji kullanımını önemli ölçüde istatiksel olarak yordadığı görülmüştür p<.05.%36'lık varyansın içinde % 4 kısmın, ustalık-yaklaşım hedef yöneliminin açıkladığı belirlenmiştir.Bunun yanında, ustalık-kaçınma hedef yöneliminin, başarım-yaklaşım hedef yönelimi, başarım-kaçınma hedef yönelimi ve kişisel ilgilerin bilişüstü strateji kullanımı önemli ölçüde tahmin etmediği görülmüştür. Bu çalışmanın sonuçları, üniversite hocaları, araştırmacılar ve program hazırlayıcılar için bir bilgilendirme niteliğindedir. Fen öğretimini planlarken, başarı hedef yönelimlerinin üstbilişsel strateji kullanımı ile ilgili olduğu göz önünde bulundurmalı, güdüleyici ve üstbilişsel strateji kullanımı içeren aktiviteler hazırlanmalıdır.

Bu çalışma için küçük bir örneklemden bir veri toplanmıştır.Dolayısıyla, daha güvenilir sonuçlara ulaşmak için daha büyük örneklemden veri toplanmalıdır.Ayrıca, gelecek çalışmalara sosyoekonomik düzeyi, etnik köken, bireylerin ön bilgisi, başarı düzeyleri ve cinsiyet gibi bireysel faktörlerin katılmasının daha güvenilir sonuçların elde edilmesinde önemli olduğu söylenilmektedir.Diğer yandan, fen bilgisi öğretmen adaylarının anketlere cevap verirken, yanlı cevap vermiş olasılığı olduğundan, bu çalışmanın sonuçları doğrulaması açısından bu alanda yapılacak çalışmalara ihtiyaç vardır.Son olarak, bu çalışma değişkenler arasında nedensellik ilişkisi sağlamadığı için deneysel çalışmalara yürütülmelidir.

6

INTRODUCTION

Self-regulated learning is defined as "it is 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" (Pintrich, 2000, p.453). Based on this terminology, Pintrich (2000) proposed general framework for self-regulated learning which is composed of four phases; forethought, monitoring, controlling and reflection phases. In the forethought phase, self-regulation activities which are goal setting, prior content knowledge activation, metacognitive knowledge activation, efficacy judgments, time and effort planning, and perceptions of task are involved. The monitoring phase is related to metacognitive awareness of different aspects of self and task or context. The control phase includes selection and adaptation of cognitive strategies for learning, thinking, motivation and affect, and regulation of effort, task, and context. The reflection phase involves cognitive judgments, affective reactions, making choices, and evaluations of the task.

Leutwyler (2009) stated that comprehensive self-regulated learning only becomes possible when the learner possesses a repertoire of strategies which includes cognitive, metacognitive and motivational. Among these strategies, cognitive and metacognitive strategies are cornerstone of self-regulated learning (Somuncuoglu & Yildirim, 1999). Cognitive strategies include rehearsal, elaboration, organization, and critical thinking strategies to help learner encode, organize and retrieve new information (Schraw, Crippen & Hartley, 2006). On the other hand, metacognitive strategies are high level administrative processes which provide learners to control and manage their learning processes including planning, monitoring, and regulating (Gall, Gall, Jacobsen, & Bullock, 1990). There are two subcomponents of metacognitive strategies which are knowledge of cognition and regulation of cognition (Schraw & Moshman, 1995). Knowledge of cognition refers to what individuals know about their cognition and involve three subcomponents. According to Schraw et al. (2006), declarative knowledge is composed of knowledge about learners' their performance and factors which have influence on their performance. Procedural knowledge includes knowledge about strategies and other procedures to learn a task. Finally, conditional knowledge refer to knowledge of why and when to use a particular strategy. Alexander, Carr and Schwanenflugel (1995); Baird and White (1996) declared that individuals have knowledge of cognition which is late developing and explicit. Therefore, adults have more knowledge about their own cognition and can describe knowledge better than children and adolescents. Regulation of cognition is composed of three components, planning, monitoring, and evaluation. Schraw et al. (2006) stated that planning is related to appropriate strategies and the usage of resources, including goal setting, activating relevant background knowledge, and budgeting time. Monitoring means controlling learning by the self-testing skills. Evaluation includes appraising the products and regulatory processes of learning. Research on regulation cognition indicates that these processes happen automatically in especially adult learner. This is because they might not be conscious and explicit in learning environments (Butler & Winne, 1995).

Despite importance of cognitive and metacognitive strategies for student learning, Pintrich (1988) claimed that students also should be motivated to use these strategies and regulate their cognition and effort. Therefore, motivational self-regualtion also plays a central role in an integrated model of self-regulated learning (Pintrich & De Groot, 1990). Motivational self-regulation is conceptualized as including all those attitudes, abilities, and motivational factors that have the objective of facilitating learning, sustaining effort and attention, and enabling completion of activities, such as self-esteem, self-efficacy beliefs, outcome expectancy, interest and goal orientation (Deci & Ryan, 1985; Dweck & Elliott, 1983).Garcia & Pintrich, 1994; Sungur & Tekkaya, 2006).

One of these motivational factors is goal orientation. According to socio-cognitive theories of motivation, a pursuing goal influences in interpreting and responding to events, producing associated patterns of cognition, affect, and behavior (Dweck & Leggett, 1988). This premise has made the type of academic goals that a student pursues as one of the most important variables in motivational research in educational contexts (Poondej, Koul & Sujivorakul, 2013). Motivational goals have been defined in the literature as achievement goal orientation which is general orientation to the task that includes a number of related beliefs about purposes for doing the task, competence, success, ability, effort, and standards to evaluate task performance (Pintrich, 2000). In other words, goal orientations are concerned with why individuals want to success and how they approach and engage in the task.In

7

related literature, goal orientation is divided into two categories and they are labeled differently such as learning and performance goals (Elliot & Dweck, 1988; Miller, Behrens, Greene & Newman, 1993); task and ego goals (Fox, Goudes, Biddle, Duda & Armstrong, 1994); mastery and performance (Ames & Archer, 1988); and task-focused and ability-focused goals (Maehr & Midgley, 1991). Although there are disagreement among researchers in terms of labeling, mastery and performance goals terms have been used in many researches to differentiate two general goal orientations. Mastery goal orientation is related to learning, mastering the task, developing new skills, trying to gain understanding or insight (Dweck & Leggett, 1988; Maehr & Midgley, 1991; Nicholls, 1984). Being mastery goal oriented is related to adaptive perceptions and behaviors including use of learning strategies (Ho & Hau, 2008; Somuncuoğlu & Yıldırım, 1999). In contrast, performance goal orientation is concerned with demonstrating competence or ability and being best compared to others, (Dweck & Leggett, 1998; Midgley et al., 1998). Learners with performance goals show maladaptive perceptions and behaviors such as using less learning strategies (Somuncuoğlu & Yıldırım, 1999). Increase in research on goal orientation showed that mastery goal orientation and performance goal orientation can be related to both adaptive and maladaptive behaviors (Bulus, 2011). Therefore, these goal orientations are examined in terms of approaching goals or avoiding goals. From this perspective, four type goal orientations were synthesized. According to Pintrich and Schunk (2002), mastery approach goal orientation focuses on understanding, learning task while mastery avoidance goal orientation is associated with tendencies to avoid work and minimizing effort. Performance approach goal orientation is related to being best in group or doing task best in comparison to other people. Performance avoidance goal orientation focuses on not looking dumb and stupid compared to other people (Pintrich & Schunk, 2002). Research stated that while student who are performance-approach oriented demonstrate adaptive behaviors such as use of learning strategies (Pintrich, 2000; Wolters, Yu & Pintrich, 1996), performance-avoidance oriented student show negative outcomes in use of learning strategies and achievement (Elliot & Church, 1997). Mastery-avoidance goal oriented students showed negative outcomes such as not applying learning strategies to new task to learn (Elliot, 1999).

During the past two decades, interest has also become another important motivational construct for understanding the processes and outcomes of learning (Leibham, Alexander & Johnson, 2013). According to Krapp, Hidi and Renninger (1992), there are three perspectives in interest research. Personal interest refers to characteristic of individual which is stable, enduring disposition of individual. Personal enjoyment, personal importance of topic, preference for certain topics and general liking for special field constitute cornerstone of personal interest (Schiefele, Krapp & Winteler, 1992). Situational interest is another perspective in research studies which is relate to interestingness of the content such as novelty, surprise, and complexity while interest as psychological state is generated by interaction between personal interest and interesting environmental features. Among these interest perspectives, personal interest demonstrates individual differences in terms of learning, thinking and performance (Pintrich & Schunk, 2002). Specifically, personal interest has led to desirable outcomes in children including persistence (Renninger & Hidi, 2002), task completion (Xu, 2008), and achievement (Singh, Granville & Dika, 2002). Likewise, interest towards science plays an important role in science learning and choosing science-related careers (Tai, Liu, Maltese & Fan, 2006).

In the literature, some studies were conducted to explore relationship among self-regulation, goal orientations and interest. For example, Iverach and Fisher (2008) reported that while mastery approach and performance avoidance goals were positively related to self-regulation, while the mastery avoidance and performance approach goals were negatively related to self-regulation. In same vein, Bembenutty (2012) did a research with preservice teachers and found that having a mastery-goal orientation is positively associated with self-regulation. In meta-analysis of Cellar et al. (2011), it was also found that the mastery-approach goal orientation construct was positively related to the self-regulation. Conversely, negative relationships were reported between the performance-avoidance goal orientation and self- regulation. Concerning interest, Pintrich and De Groot (1990); Pintrich, Roeser, and De Groot (1993); Iverach and Fisher (2008) found that there are significantly positive relationship between interest and self-regulation. Likewise, Sansone & Thoman (2005); Lee, Lee and Bong (2014) reported that interest is the strong predictor of academic self-regulation. In addition, O'Keefe and Garcia (2014) pointed out that undergraduate students with high interest to task show better self-regulation behavior.

8

The Statement of Problem

The primary goal of science education is to develop students as life-long learners, help students to be active in learning process and self-regulate their acquisition and construction of knowledge (Ministry of National Education of Turkey [MONE], 2006). Arsal (2009) emphasized that it is important for teachers to help students to become self-regulated learner. The affective way to teach of self-regulation is to experience self-regulation in their learning environments. For this purpose, Taylor and Corrigan (2005) claimed that providing pre-service science teachers with suitable self-regulated learning environments contributes to development of their future students' self-regulation and science learning. Development of self-regulated learning depends on use of learning strategies (Akyol, Sungur, & Tekkaya, 2010). Therefore, it is important to investigate preservice science teachers with respect to use of learning strategies.

As similar to studies related to self-regulation, research showed that using learning strategy is related to goal orientation and interest. For example, Butler (2007) claimed that goal orientation presents useful framework for individuals motive for learning since individuals' perception, learning strategies and outcome depend on what they want. Clercq, Galand and Frenay (2013) found that mastery goal orientation is significant predictor of using deep processing strategies. In the same vein, Kahraman and Sungur (2011) conducted a study with elementary students to examine how goal orientation predicts metacognitive strategy use. They found similar result that mastery approach goals tend to use metacognitive strategies in science. In addition, Ee, Moore, and Atputhasamy (2003); Pintrich and De Groot, (1990); Tung-hsien (2004); Valle et al., (2003); and Wolters, Yu, and Pintrich, (1996) stated that mastery goals are associated with higher levels of metacognitive strategy use. Regarding interest, it was found that interest is one of influential factor on using students' learning strategies. For instance, Pintrich and Garcia (1991), and Schiefele (1991) reported that interest of college students and junior students is positively related with deep processing strategies such as organization critical thinking, and elaboration. Likewise, Wigfield and Eccles (2000) pointed out that students having an intrinsic interest enable to persist in overcoming difficulties and succeed on academic tasks by using metacognitive strategies.

In the literature, there is no sufficient research concerning investigating the contribution of both goal orientation and interest in use of metacognitive strategies studies. Moreover, in Turkey metacognitive strategy use, goal orientation, and interest were investigated in terms of different variables such as achievement, competence expectancy, perception, and self-efficacy(e.g. Akyol, Sungur & Tekkaya, 2010; Bulus, Duru, Balkis, & Duru, 2011; Sungur, 2007; Sungur & Senler, 2009, 2010). However, relationship among these three constructs, which are metacognitive strategy use, goal orientation, and interest was examined in few research. Hence, the aim of this study aimed to determine role of preservice science teachers' achievement goal orientations and personal interest in prediction of metacognitive strategy use. Accordingly, this study aimed at addressing the following research question:

What is the contribution of achievement goal orientation and personal interest in prediction of metacognitive strategy of preservice science teacher?

METHOD

Sample

The participants of this study were 322 preservice science teachers (96 boys and 226 girls, mean age= 21.54 and *SD* = 1.65) from one public university in Ankara, Turkey. Among these preservice teachers, 37.3% was freshman, 26.5% was sophomore, 24.5% was junior and 11.8% was senior in this university. The mean and standard deviation of preservice science teacher' GPA were 2.33 and .52, respectively. While 7.8% preservice science students was member any club or organization concerning science, 92.2 % of them declared that they were not member of a science club or organization. Moreover, they were asked to how many books or journal related science they have. 40.2% of the preservice science teachers had books or journal ranged from 0 to 10. 30.4% of them stated that number of science books or journal was between 11 and 25. 19.6% these teachers reported to have 26-50. 8.8% of preservice science teacher indicated that they possessed nearly more than 50 science books or journal.

9

Instruments
Motivated Strategies for Learning Questionnaire (MSLQ)
The Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich, Smith, Garcia, and McKeachie (1991) was translated and adapted into Turkish by Sungur (2004). This scale consisted of two sections which were the motivation section (31 items) and the learning strategies section (50 items). The items were scored on a 7-point Likert-type scale from 1 (not at all true for me) to 7 (very true for me). 31 items of the MSLQ related to students' use of several cognitive and metacognitive strategies in learning strategies section part were used for the subject area ''science''. The items were categorized into five subscales: rehearsal (4 items, α = .65), elaboration (6 items, α= .76), organization (4 items, α = .59), critical thinking (5 items, α = .72), and metacognitive self-regulation (12 items, α = .80). In this study, only metacognitive self-regulation subscale was used to measure of metacognitive strategy use. Reliability coefficient of this subscale was founded .82 which was nearly same with result of study of Sungur (2004). In addition, this metacognitive self-regulation subscale was examined in terms of structural validity by confirmatory factor analysis. According to Kline (2005), there are four fit indices which are the χ^2/df ratio, the Tucker-Lewis index (TLI), the comparative-fit-index (CFI), and the root mean squared error of approximation (RMSEA). A good fit is indicated when χ^2/df < 3.00; TLI and CFI > .90, and RMSEA < .08. The result of confirmatory factor analysis showed good fit (χ^2/df = 2.38, TFI = .93, CFI = .98 and RMSEA = .04).
Achievement Goals Questionnaire (AGQ)
The achievement goal questionnaire scale was developed by Elliot and Mcgregor (2001) to determine achievement goals of student. It translated and adapted into Turkish by Senler & Sungur (2007). It was comprised of 15 items in four subscales which are mastery-approach goals (3 items), mastery-avoidance goals (3 items), performance-approach goals (3 items) and performance avoidance goals (6 items). The items were scored on a 5-point Likert-scale ranging from strongly agree to strongly disagree. After collecting of data, reliability of coefficients was examined for each dimension, mastery-approach goals (α= .73), mastery-avoidance goals (α= .75), performance-approach goals (α= .86) and performance avoidance goals (α= .82). In addition, in terms of structural validity, confirmatory factor analysis showed that it have adequate fit (χ^2/df = 5.82, TFI = 0.95, CFI = .95 and RMSEA = .07).
The Academic Interest Questionnaire (AIQ)
The academic interest questionnaire was developed by Corbiere, Fraccaroli, Mbekou, & Perron (2006) to assess students' interest in science. It was translated and adapted into Turkish by Senler and Sungur (2009). It consisted of 6 items and these items were scored on 5 point-Likert type scales ranging from completely agree to completely disagree. Reliability coefficient of data of this scale was .83 which was higher to result of study (α = .71) of Senler and Sungur (2009). Moreover, confirmatory factor analysis showed that it have good fit (χ^2/df = 3.12 TFI = .97, CFI = .95 and RMSEA = .05).

Data Analysis Procedure
In this study, in order to find out how well goal orientations and personal interest is able to predict metacognitive strategy use, multiple regression analysis was conducted. Multiple regression is a technique which allows to explore prediction of dependent variable based on two or more independent variables related to dependent variable (Pallant, 2007). Before conducting this analysis, assumptions of multiple regression which are normality, linearity, multicollinearity, and homoscedasticity was also checked to reach reliable results.

RESULTS

In order to address the research question, multiple regression analysis was performed. Before that, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Especially, multicollinearity was examined in detail to reach reliable results. According to Pallant (2007), multicollinearity does not exist when the correlation between variables should be less than .07, tolerance value are higher than .10 and VIF values are less than 10. These correlations and values are presented Table 1 and Table 2. As can be seen below, there is no violation of multicollinearity.

Table 1: Correlations between Variables

Variables	1	2	3	4	5	6
1.Mastery approach goal orientation	1	.46	.14	.31	.58	.51
2.Performance approach goal orientation		1	.25	.18	.23	.33
3.Mastery avoidance goal orientation			1	.12	.44	.34
4.Performance avoidance goal orientation				1	.12	.32
5.Personal interest					1	.47
6.Metacognitive strategy use						1

Table 2: Tolerance and VIF Values of Variables

Variables	Tolerance	VIF
Mastery approach goal orientation	.54	1.87
Performance approach goal orientation	.49	2.05
Mastery avoidance goal orientation	.67	1.49
Performance avoidance goal orientation	.46	2.16
Personal interest	.54	1.84

The results of main analysis indicate that these motivational factors accounted for 33.6% of the variation in preservice science teachers' metacognitive strategy use, $R = .58$, $F (5, 96) = 9.70$, $p < .05$. More specifically, it is found that mastery approach goal orientation made significantly contribution to prediction of metacognitive strategy use ($p < .05$) while mastery avoidance goal, performance approach, performance avoidance goal orientations and personal interest failed to reach significance. Mastery approach goal orientation (Beta = .28, sr-squared = .04) was statistically significantly predicted preservice science teachers' metacognitive strategy use in science courses. Sr–squared represented that 4% variance is explained by only mastery approach goal orientation over 33.6% variance in preservice science teachers' metacognitive strategy use, The Beta coefficients, values of sr-squared and related significance values were presented in Table 3.

Table 3: Contribution of Motivational Factors on Metacognitive Strategy Use

Motivational factors	Beta	Sr-squared	p
Mastery approach goal orientation	.28	.04	.01
Performance approach goal orientation	.18	.03	.14
Mastery avoidance goal orientation	.20	.02	.06
Performance avoidance goal orientation	-.24	.03	.06
Personal interest	.19	.03	.10

DISCUSSION and IMPLICATION

This research aimed to examine role of achievement goals and personal interest of preservice science teachers on prediction of metacognitive strategies use. For this purpose, multiple regression analysis was conducted. It was found that only mastery approach goal orientation among these motivational factors made a significantly contribution to prediction of preservice science teachers' metacognitive strategy use in science course. This result was in congruence with finding conducted among students in the literature (Clercq, Galand, & Frenay, 2013; Ee, Moore, and Atputhasamy, 2003; Kahraman, & Sungur, 2011; Pintrich and De Groot, 1990; Tung-hsien, 2004; Valle et al., 2003; and Wolters, Yu, & Pintrich, 1996). This finding may imply that these preservice teacher want to become efficient teacher; therefore, they work in the light of this aim. As a second result, it was found that the contribution of performance approach goals to use of metacognitive strategies was not statistically significant. This finding was in contradiction with finding of researchers concerning students (Pintrich, 2000; Wolters et al., 1999). This result may be caused by Turkish educational system. Senler and Sungur (2009) declared that Turkish students are educated competitive and examination oriented. Especially, after they graduate high school, they take highly competitive examination to enter university. Therefore, this situation may influence negatively and make them show less competitive behaviors in university courses. Another result in this study was related to mastery avoidance goal orientation. In related literature, Elliot (1999) founded that individuals avoided trying tasks and activities in mastery avoidance goal orientation. Based on finding of studies of Iverach and Fisher (2008); Cellar et al. (2011), it was expected that higher levels of mastery avoidance goal orientation were associated with

11

lower level use of metacognitive strategies, However, it was found that mastery avoidance goal orientation did not predict statistically metacognitive strategy use of preservice science students. The reason of this result may be due the fact that preservice science teachers know they are responsible for learning of science teaching; therefore, they do not show avoidance about trying task or activities. Concerning performance avoidance goal orientation, this study revealed that there was no a significant contribution to prediction of preservice science teachers' metacognitive strategy use in science courses. The finding of this study was contradiction with finding of researchers which was that performance avoidance goal orientation was related to use less metacognitive strategy (Elliot & Church, 1997). The reason of this research finding can be related to inapplicability of this goal orientation for preservice teachers. More specifically, prior studies related to this goal orientations were conducted with students. Therefore, preservice teachers may not find this goal orientation meaningful since the focus of this orientation is to avoid looking dumb in comparison others (Pintrich & Schunk, 2002). Lastly, concerning the contribution of personal interest to science, it was expected that personal interest predict significantly in terms of statistical to use of metacognitive strategies in science course since Pintrich and Garcia (1991); Schiefele (1991), and Wigfield and Eccles (2000) reported that having interest to a task was positively associated with use of metacognitive strategy. However, in this study it was found that interest did not make significantly contribution to prediction of preservice science teachers' metacognitive strategy use in science course. The role of other motivational factors which were not examined in this study may lead to occurrence of this finding. According to Sungur & Tekkaya (2006), self-efficacy belief, task value, outcome expectancy are other motivational factors that influence self-regulation process. Since these factors were not controlled in the analysis, this finding that interest did not significantly predict use of metacognitive strategies may be found.

The results of this study would be informing for university teachers, researchers and policy makers; when planning science instruction, they would be aware of the fact that motivational factors would be related to using learning strategies and they would use motivational factors and learning strategies together in science lesson.

LIMITATIONS and FUTURE DIRECTIONS

In this study, data was gathered from small sample in a state college. Therefore, in order to reach more reliable results, future researches should include more participants. Another limitation of this study is that there are other factors which have influence on metacognitive strategy use of preservice teacher. Teacher background variables (SES, ethnicity, past performance, prior knowledge, gender) also affect metacognitive strategy use (Akyol, Sungur & Tekkaya, 2010). Therefore, it is suggested that in future studies these factors should be examined with motivational factors to learn inclusion of background variables into these motivational variables.

In addition, there may be possibility of social desirability in preservice science teachers' responses in these scales in this study. Therefore, future studies are needed to validate the results of this study. Also, this study does not provide causal relationship among these variables. In order to reach causal relationship about them, experimental studies should be conducted.

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