# An Analysis of Scores of Prospective Biology Teachers on the Factors of MSLQ

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**Abstract.** The factors of learning strategies and motivation as components of self-regulation are determined well in MSLQ (Motivated Strategies for Learning Questionnaire) scale. The scale includes 15 factors. But, these 15 factors are not appropriate for practical use. In this study, a survey research was conducted with 112 prospective biology teachers by using MSLQ to analyze the factors. One-way ANOVAs and Pearson Product-Moment Correlation Coefficients were used for analysis. The results of ANOVAs showed that there were no statistically significant differences between mean scores of the participants at different grade levels on scales of MSLQ. In addition, the "task value", the "self-efficacy" and the "help seeking" sub-factors were found to be the most dominant sub-factors of the whole scale. In the article, results of the study and limitations will be discussed.

**Key Words:** Prospective biology teachers, MSLQ, Self-regulated learning.

**Özet.** Güdülenme ve öğrenme stratejilerine ait faktörler, öz-düzenleme becerisinin öğeleri olarak GÖSÖ (Güdülenme ve Öğrenme Stratejileri Ölçeği) ölçeğinde iyi bir şekilde tanımlamıştır. GÖSÖ 15 faktörden oluşan, yaygın olarak kullanılan bir ölçektir. Fakat bu 15 faktör pratik kullanımda problem oluşturmaktadır. Ölçekle yapılan araştırmalarda, sıklıkla daha özel alanlarda ölçeğin kullanımı açısından araştırmalar yapılması gerektiği

vurgulanmaktadır. Bu çalışmada, ölçeğin, daha spesifik bir alanda (biyoloji), faktörleri arasındaki korelasyonel baskınlığı analiz etmek ve daha az sayıda faktörü dikkate alan bir model önermek amaçlanmıştır. Çalışma, 112 biyoloji öğretmeni adayıyla, tarama modeli kullanılarak yürütülmüştür. Veri analizi için, tek-yönlü ANOVA ve Pearson korelasyon katsayısı teknikleri kullanılmıştır. ANOVA sonuçları GÖSÖ ölçeğinde farklı sınıf kademelerindeki katılımcıların puanları arasında istatistik olarak anlamlı bir fark olmadığını göstermektedir (faktörler açısından homojen gruplar). Bu analiz üzerine yapılan korelasyon katsayısı analizleri, "görev değeri", "öz-yeterlik" ve "yardım isteme" faktörlerinin tüm ölçekte en baskın faktörler olduğunu göstermiştir. Bu faktörler, pratik kullanım açısından önemli bir avantaj sağlamaktadır. Bu makalede, çalışmanın sonuçları ve sınırlılıkları tartışılacaktır.

**Anahtar Kelimeler:** Aday biyoloji öğretmenleri, GÖSÖ, Öz-düzenleyici öğrenme.

## INTRODUCTION

Learning as an end product of the educational activities, is affected by personal, environmental and social factors. As a type of learning, self-regulated learning model has been explaining some of these factors in a meaningful way (Gredler, 2005). Sometimes, the term might be synonymously used with learning term. But, there are differences between them. As learners have some choice about situation in self-regulation, learning does not require self-regulation and choice for activities (Schunk, 2000). Basically, self-regulated learning or self-regulation refers to the process in which the learners deliberately direct their thoughts, actions, feelings and efforts to achieve their goal (Pintrich, 1990). Self-regulated learners are able to consider their motivational state, metacognitively aware, monitor their understanding, use learning strategies in a unique way, and able to evaluate their progress and competencies to achieve their goals (Schunk, 2000; Chen, 2002). Learners from self-regulation perspective are assumed to construct their own meanings, goals, and strategies from both the "external" information in environment as well as internal information in their own minds (Pintrich, 2004). One important aspect of the self-regulated learning is why and how students choose to participant activities and use certain strategies and process. This refers the motivational aspects of self-regulation (Chen, 2002). Self-regulation is related with motivation. The main component of motivation with related to self-regulation is the value students give to learning (Schunk, 2000). Students who give value what they learn are

motivated to regulate their activities. There are five components of motivation, these are "Intrinsic goal orientation", "Test anxiety", "Control of learning beliefs", "Self-efficacy for learning and performance" and "Extrinsic goal orientation". According to Pintrich (1999), "Intrinsic goal orientation" component refers to focus of students on mastery and learning of the task and in contrast, "Extrinsic goal orientation" refers to focus of students on grades, their abilities with related to social comparisons or other extrinsic factors. By considering Mallow (1978)'s description, "Test anxiety" can be described as a diffuse or vague fear arises in response to the prospect of any test. As the other aspects, Pintrich (1999) stated that "Self-efficacy for learning and performance" refers to judgments of one's abilities to conduct any academic task and also "Control of learning beliefs" component refers to awareness of one's own responsibilities on and control ability for his or her performance. Learners motivated to achieve a goal by self-regulatory activities are more successful in using the strategies they believe will help them. These strategies are called as learning strategies. The circular relationship among goal, self-regulation, motivation and learning strategies mentioned above can be illustrated as the follow;
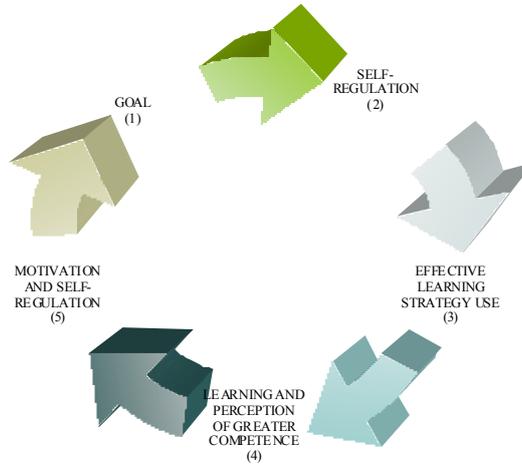


**Figure 1.** *Diagram Of Circular Relationship Among Goal, Self-Regulation, Motivation And Learning Strategies (The diagram was inspired from Schunk (2000)).*

When taken information processing perspective into consideration, learning strategies can be described as behaviors, thoughts and activities in which student engages and which are intended to influence student's encoding

process to achieve (Weinstein and Mayer, 1983; Sankaran and Bui, 2001). Thus, use of particular learning strategy may be to affect and allow students to actively process information by a way in which student selects, elaborates, acquires, organizes, or integrates new knowledge (Sankaran and Bui, 2001. Some major categories of learning strategies are: (1) rehearsal strategies such as copying, underlining, or shadowing; (2) elaboration strategies such as paraphrasing or summarizing; (3) organizational strategies such as outlining or creating a hierarchy; (4) critical thinking strategies that refer to relate new knowledge to old one and are used to apply prior knowledge to new situations and solve problems, to analyze and evaluate information in a thoughtful manner. (5) metacognitive strategies that represents activities that help the students plan their learning (e.g., set goals). The scales of rehearsal, elaboration, and organization reflect the use of basic cognitive and learning strategies to understand the material in the course (Pintrich, 2004; Weinstein and Mayer, 1983).

Self-regulated learning and motivation components are context sensitive (Pintrich & De Groot, 1990; Wolters & Pintrich, 1998). As different contexts for self-regulated learning and motivation, biology courses included in biology teacher education programmes need to be investigated in terms of subfactors of MSLQ as a tool for assessing self-regulated learning and motivation. In this context, there is no enough research on prospective biology teachers in terms of self-regulated learning and motivation subfactors and number of factors in MSLQ is a problem for use in practical way. In this study, the aim is to analyze the scores of prospective biology teachers on the sub-factors of the self-regulated learning for differences across grade level and relationships among them and to discuss results to provide practical way to use it.

**Participants**

The study was conducted with 112 prospective biology teachers in Gazi University in 2006-2007 education years. The training of biology teachers in Turkey has been taking five years. But, fifth grades were not willing to participate to the study; therefore, they were not included in the study. The university they enrolled in was a Turkey state university. The descriptive values about them are presented in table 1.

**Table 1**. Descriptive Values For Participants Of The Study

| Parameters | Levels of Parameters | N | % |
|---|---|---|---|
| Grade | 1 | 40 | 35.7 |
| | 2 | 26 | 23.2 |
| | 3 | 22 | 19.6 |
| | 4 | 24 | 21.4 |
| | Missing | - | - |
| Age | 18 | 9 | 8.00 |
| | 19 | 21 | 18.8 |
| | 20 | 26 | 23.2 |
| | 21 | 25 | 22.3 |
| | 22 | 23 | 20.5 |
| | 23 | 3 | 2.7 |
| | Missing | 5 | 4.5 |
| Gender | Female | 82 | 73.2 |
| | Male | 26 | 23.2 |
| | Missing | 4 | 3.6 |

When considered Table 1, it can be seen that the majority of the participants are freshman level students, and their ages ranges from 19 to 22. For the gender variable, 73.2% of the participants are females. In addition to these, there are missings in two descriptive parameters; age and gender; the missings are too few to affect the results of the study.

**Instrument**

In the study, the MSLQ scale was used to obtain data about association among factors that were subcomponents of motivational belief and learning strategies parts of the scale. The scale is a self-report instrument and has 81 items, 31 of them assess motivational factors, and rest of them focuses on learning strategies factors. The instrument is a seven point scale with extremes signed by "not at all true of me" and "very true of me". The scale was translated into Turkish and their validity and reliability study was conducted by Büyüköztürk et al. (2004). They applied the scale to 17 bilingual students in Turkey and revised it, and then revised scale was applied to 852 university students. The total interscore correlation coefficients were found to be .85 for motivation part and .86 for learning strategies parts by considering scores from the Turkish and English form of

the scale. They carried out exploratory and confirmatory factor analyses. The results of factor analyses confirmed consistency between the original scale and translated version. At the same time, they used t –test for independent groups to analyze differences between upper 27% and lower 27%. The whole scale, subparts and cronbach alpha coefficients can be seen in Table 2.

**Table 2**. MSLQ Main Factors, Subfactors And Their Item With Cronbach Alpha Coefficients For The Turkish Version Of The Scale.

| Main factors | Subfactors | Items | Cronbach alpha coeff. |
|---|---|---|---|
| Motivation | Intrinsic goal orientation | 1,16,22,24 | .59 |
| | Extrinsic goal orientation | 7,11,13,30 | .63 |
| | Control of learning beliefs | 2,9,18,25 | .80 |
| | Task value | 4,10, 17, 23, 26, 27 | .52 |
| | Self-efficacy for learning and performance | 5,6,12,15,20,21,29,31 | .86 |
| | Test anxiety | 3,8,14,19,28 | .69 |
| Learning Strategies | Rehearsal | 39, 46, 59, 72 | .62 |
| | Elaboration | 53, 62, 64, 67, 69,81 | .74 |
| | Organization | 32, 42, 49, 63 | .61 |
| | Critical Thinking | 38, 47, 51, 66, 71 | .74 |
| | Metacognitive self-regulation | 33, 36, 41, 44, 54, 55, 56, 57, 61, 76, 78 | .75 |
| | Time and study environment management | 35, 43, 52, 65, 70, 73, 77, 80 | .61 |
| | Effort regulation | 79, 37, 48, 60, 74 | .41 |
| | Peer learning | 34, 45, 50 | .46 |
| | Help seeking | 40, 58, 68, 75 | .49 |

Then, the authors conducted explanatory and confirmatory factor analyses to get evidence for factors of the scale. The results of confirmatory factor analyses can be seen table 3.

**Table 3**. Confirmatory Factor Analysis Results

| Fit Indexes | Values |
|---|---|
| $\chi^2/df$ | .004 |
| GFI | .80 |
| AGFI | .77 |
| CFI | .70 |
| NNFI | .67 |
| RMR | .22 |
| SRMR | .06 |
| RMSEA | .07 |

For each factor, they found a mean difference between scores of upper 27% and lower 27% groups on MSLQ. According to results of all analyses, the scale was found to be appropriate to use to know about motivational beliefs and learning strategies of university students.

**RESULTS**

The results of the study will be explained as two categories under this title. The categories are one-way ANOVA results for all grades in terms of all subfactors and intercorrelation results. Table 4 presents the one-way ANOVA results for scores of four grades determined as freshman, sophomore, junior and senior on all subfactors of MSLQ.

**Table 4**. One-way ANOVA Results For Scores Of All Students Across The Grade On All Subfactors Of The Scale.

| Sub-factor | Grades | N | Mean | SS | df | MS | F | *p* |
|---|---|---|---|---|---|---|---|---|
| Intrinsic | Freshman | 40 | 5.59 | 1.85 | 3 | .62 | .70 | .55 |
| | Sophomore | 26 | 5.65 | | | | | |
| | Junior | 22 | 5.40 | | | | | |
| | Senior | 24 | 5.79 | | | | | |
| Extrinsic | Freshman | 40 | 4.42 | .85 | 3 | .28 | .18 | .91 |
| | Sophomore | 25 | 4.28 | | | | | |
| | Junior | 22 | 4.18 | | | | | |
| | Senior | 24 | 4.31 | | | | | |
| Task | Freshman | 40 | 5.15 | 3.29 | 3 | 1.10 | 1.85 | .14 |
| | Sophomore | 25 | 5.53 | | | | | |
| | Junior | 22 | 5.27 | | | | | |
| | Senior | 24 | 5.53 | | | | | |
| Control | Freshman | 40 | 5.29 | 1.81 | 3 | .60 | .83 | .48 |
| | Sophomore | 26 | 5.53 | | | | | |
| | Junior | 22 | 5.19 | | | | | |
| | Senior | 23 | 5.18 | | | | | |
| Self-efficacy | Freshman | 40 | 4.93 | 4.07 | 3 | 1.36 | 1.93 | .13 |
| | Sophomore | 24 | 5.30 | | | | | |
| | Junior | 22 | 5.24 | | | | | |
| | Senior | 21 | 5.42 | | | | | |
| Test | Freshman | 39 | 3.61 | 7.26 | 3 | 2.42 | .80 | .15 |
| | Sophomore | 25 | 3.30 | | | | | |
| | Junior | 21 | 3.18 | | | | | |
| | Senior | 23 | 3.60 | | | | | |
| Rehearsal | Freshman | 40 | 4.89 | 5.85 | 3 | 1.95 | .58 | .20 |
| | Sophomore | 24 | 5.43 | | | | | |
| | Junior | 21 | 5.21 | | | | | |
| | Senior | 24 | 4.85 | | | | | |
| Organization | Freshman | 40 | 5.44 | 2.00 | 3 | .67 | .74 | .53 |
| | Sophomore | 26 | 5.74 | | | | | |
| | Junior | 22 | 5.73 | | | | | |
| | Senior | 24 | 5.51 | | | | | |
| Elaboration | Freshman | 40 | 5.08 | 8.15 | 3 | 2.72 | 3.24 | .03 |
| | Sophomore | 26 | 5.78 | | | | | |
| | Junior | 22 | 5.48 | | | | | |
| | Senior | 24 | 5.32 | | | | | |

**Table 4. (Devamı)**. One-way ANOVA Results For Scores Of All Students Across The Grade On All Subfactors Of The Scale.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Critical Thinking | Freshman | 39 | 4.81 | 6.19 | 3 | 2.06 | 2.15 | .20 |
| | Sophomore | 26 | 5.39 | | | | | |
| | Junior | 22 | 4.94 | | | | | |
| | Senior | 23 | 5.20 | | | | | |
| Metacognition | Freshman | 37 | 4.76 | 3.32 | 3 | 1.11 | 2.34 | .08 |
| | Sophomore | 25 | 5.22 | | | | | |
| | Junior | 21 | 4.92 | | | | | |
| | Senior | 24 | 4.85 | | | | | |
| Time | Freshman | 35 | 4.47 | .16 | 3 | .05 | .13 | .94 |
| | Sophomore | 24 | 4.52 | | | | | |
| | Junior | 20 | 4.55 | | | | | |
| | Senior | 23 | 4.57 | | | | | |
| Effort | Freshman | 39 | 4.32 | 2.19 | 3 | .73 | 1.55 | .21 |
| | Sophomore | 26 | 4.54 | | | | | |
| | Junior | 22 | 4.59 | | | | | |
| | Senior | 24 | 4.23 | | | | | |
| Peer | Freshman | 39 | 4.15 | 16.12 | 3 | 5.37 | 3.32 | .02 |
| | Sophomore | 25 | 5.04 | | | | | |
| | Junior | 22 | 4.27 | | | | | |
| | Senior | 23 | 4.01 | | | | | |
| Help | Freshman | 40 | 4.79 | .78 | 3 | .26 | .43 | .73 |
| | Sophomore | 26 | 4.90 | | | | | |
| | Junior | 22 | 4.65 | | | | | |
| | Senior | 24 | 4.79 | | | | | |

*Note:* Intrinsic: Intrinsic goal orientation, Extrinsic: Extrinsic goal orientation, Task: Task value, Control: Control of learning beliefs, Self-efficacy: Self-efficacy for learning and performance, Test: Test anxiety, Time: Time and study environment management, Effort: Effort regulation, Help: Help seeking, Peer: Peer learning, Metacognition: Metacognitive self-regulation. *0.0004

In all of the data, there are missings; these are not above level of 10%, so the missings were analyzed as missings by ignoring their importance. Before running the ANOVAs, Bonferroni adjustment was conducted. When considered the results of the study presented above, one-way ANOVA analyses showed no mean differences between scores of students across the grade on all subfactors of MSLQ. This is an evidence for homogeneity of scores on factors in terms of grade level. After these results, correlational analyses were conducted.

**Table 5**. Interrelationship Among All Sub-Factors Of MSLQ

| Subfactors | Parameter | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.Intr. | r | - | | | | | | | | | | | | | | |
| | p | - | | | | | | | | | | | | | | |
| 2.Extr. | r | .08 | - | | | | | | | | | | | | | |
| | p | .41 | - | | | | | | | | | | | | | |
| 3.Task | r | .67** | .21 | - | | | | | | | | | | | | |
| | p | .00 | .03 | - | | | | | | | | | | | | |
| 4.Cont. | r | .39** | .15 | .36** | - | | | | | | | | | | | |
| | p | .00 | .12 | .00 | - | | | | | | | | | | | |
| 5.Self | r | .50** | .29** | .63** | .28** | - | | | | | | | | | | |
| | p | .00 | .00 | .00 | .00 | - | | | | | | | | | | |
| 6.Test | r | -.00 | .39** | -.08 | .01 | -.06 | - | | | | | | | | | |
| | p | .98 | .00 | .41 | .95 | .52 | - | | | | | | | | | |
| 7.Reh. | r | .07 | .33** | .34** | .07 | .32** | -.04 | - | | | | | | | | |
| | p | .48 | .00 | .00 | .50 | .00 | .68 | - | | | | | | | | |
| 8.Organ. | r | .39** | .22 | .52** | .20 | .51** | -.24 | .58** | - | | | | | | | |
| | p | .00 | .02 | .00 | .04 | .00 | .01 | .00 | - | | | | | | | |
| 9.Elab. | r | .35** | .21 | .53** | .14 | .55** | -.09 | .55** | .74** | - | | | | | | |
| | p | .00 | .03 | .00 | .16 | .00 | .34 | .00 | .00 | - | | | | | | |
| 10.Crit. | r | .47** | .15 | .51** | .07 | .55** | -.07 | .34** | .54** | .70** | - | | | | | |
| | p | .00 | .13 | .00 | .49 | .00 | .46 | .00 | .00 | .00 | - | | | | | |
| 11.Meta | r | .33** | .22 | .43** | .15 | .43** | -.07 | .58** | .61** | .67** | .62** | - | | | | |
| | p | .00 | .02 | .00 | .12 | .00 | .48 | .00 | .00 | .00 | .00 | - | | | | |
| 12.Time | r | .33** | .22 | .37** | .20 | .42** | .03 | .28 | .40** | .45** | .31** | .27 | - | | | |
| | p | .00 | .03 | .00 | .04 | .00 | .76 | .01 | .00 | .00 | .00 | .01 | - | | | |
| 13.Effort | r | .12 | .38** | .21 | .09 | .29** | .21 | .48** | .26** | .44** | .22 | .34** | .25 | - | | |
| | p | .19 | .00 | .03 | .36 | .00 | .03 | .00 | .00 | .00 | .02 | .00 | .01 | - | | |
| 14.Peer | r | .17 | .31** | .33** | .19 | .34** | .09 | .31** | .31** | .34** | .33** | .31** | .14 | .17 | - | |
| | p | .09 | .00 | .00 | .05 | .00 | .36 | .00 | .00 | .00 | .00 | .00 | .18 | .08 | - | |
| 15.Help | r | .33** | .26** | .43** | .25 | .34** | .16 | 35** | .31** | .43** | .36** | .39** | .27 | .30** | .48** | - |
| | p | .00 | .00 | .00 | .01 | .00 | .09 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | - |

**Correlation is significant at the 0.0004 level

*Note:* Intr.: Intrinsic goal orientation, Extr.: Extrinsic goal orientation, Task: Task value, Organ.:Organization, Elab. :Elaboration, Cont.: Control of learning beliefs, Reh.:Rehearsal, Self: Self-efficacy for learning and performance, Test: Test anxiety, Time: Time and study environment management, Effort: Effort regulation, Help: Help seeking, Peer: Peer learning, Meta: Metacognitive self-regulation.

As the second step, the association among subfactors of the MSLQ was investigated using Pearson product- moment correlation coefficient at the level of .0004 after the Bonferroni adjustment. Important associations among the subfactors were found (p<.0004). These results are presented as three parts; first for motivation component, second for learning strategies component and last for both components. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The data provided all assumptions. Important associations among the subfactors were found. In this study, small scale correlation coefficients were not included to provide more strict statistical analysis. The correlations are presented as couples in the table 6, table 7and table 8.

**Table 6**. Correlations Among Subfactors Of Motivation Part Of MSLQ (n=112)

| Couple | r | p | Magnitude of "r" |
|---|---|---|---|
| Intrinsic goal orientation-Task value | .67 | <.0004 | Large |
| Task value-Self-efficacy | .63 | <.0004 | Large |
| Intrinsic goal orientation-Self-efficacy | .50 | <.0004 | Large |
| Intrinsic goal orientation-Control of learning beliefs | .39 | <.0004 | Medium |
| Extrinsic goal orientation-Test anxiety | .39 | <.0004 | Medium |
| Task value-Control of learning beliefs | .36 | <.0004 | Medium |
| Extrinsic goal orientation-Self-efficacy | .29 | <.0004 | Small |
| Control of learning beliefs-Self-efficacy | .28 | <.0004 | Small |

In table 6, as far as it seems, "self-efficacy" subfactor is correlated with much more subfactors than the other subfactors when the correlation coefficients of couples are separately considered. "Task value", "self-efficacy" and "intrinsic goal orientation" subfactors are included in associations with large magnitude. At the same time, they are correlated with each other by large magnitude (r=.67, r=.63, r=.50, p<.0004).

**Table 7**. Correlations Among Subfactors Of Learning Strategies Part Of
MSLQ (n=112).

| Couple | r | *p* | *Magnitude of "r"* |
|---|---|---|---|
| Organization-Elaboration | .74 | <.0004 | Large |
| Elaboration-Critical thinking | .70 | <.0004 | Large |
| Elaboration-Metacognitive self-regulation | .67 | <.0004 | Large |
| Critical thinking- Metacognitive self-regulation | .62 | <.0004 | Large |
| Organization-Metacognitive self-regulation | .61 | <.0004 | Large |
| Rehearsal-Metacognitive self-regulation | .58 | <.0004 | Large |
| Rehearsal-Organization | .58 | <.0004 | Large |
| Rehearsal-Elaboration | .55 | <.0004 | Large |
| Organization-Critical thinking | .54 | <.0004 | Large |
| Rehearsal-Effort regulation | .48 | <.0004 | Medium |
| Peer learning-Help seeking | .48 | <.0004 | Medium |
| Elaboration-Time and study environment management | .45 | <.0004 | Medium |
| Elaboration-Effort regulation | .44 | <.0004 | Medium |
| Elaboration-Help seeking | .43 | <.0004 | Medium |
| Organization-Time and study environment management | .40 | <.0004 | Medium |
| Metacognitive self-regulation-Help seeking | .39 | <.0004 | Medium |
| Critical thinking-Help seeking | .36 | <.0004 | Medium |
| Rehearsal-Help seeking | .35 | <.0004 | Medium |
| Elaboration-Peer learning | .34 | <.0004 | Medium |
| Rehearsal-Critical Thinking | .34 | <.0004 | Medium |
| Metacognitive self-regulation-Effort regulation | .34 | <.0004 | Medium |
| Critical thinking-Peer learning | .33 | <.0004 | Medium |
| Organization-Peer learning | .31 | <.0004 | Medium |
| Organization-Help seeking | .31 | <.0004 | Medium |
| Critical thinking-Time and study environment management | .31 | <.0004 | Medium |
| Metacognitive self-regulation-Peer learning | .31 | <.0004 | Medium |
| Rehearsal-Peer learning | .31 | <.0004 | Medium |
| Effort regulation-Help seeking | .30 | <.0004 | Medium |
| Organization-Effort regulation | .26 | <.0004 | Small |

When taken the correlations among subfactors of learning strategies parts of
the inventory, although there are many statistically significant correlations
(p<.0004), it can be said that there is no any clear dominance among
subfactors.

**Table 8**. Correlations Among Subfactors Of Motivation And Learning
Strategies Parts Of MSLQ (n=112).

| Couple | r | p | Magnitude of "r" |
|---|---|---|---|
| Self-efficacy-Elaboration | .55 | <.0004 | Large |
| Self-efficacy-Critical thinking | .55 | <.0004 | Large |
| Task value-Elaboration | .53 | <.0004 | Large |
| Task value-Organization | .52 | <.0004 | Large |
| Self-efficacy-Organization | .51 | <.0004 | Large |
| Task value-Critical thinking | .51 | <.0004 | Large |
| Intrinsic goal orientation-Critical thinking | .47 | <.0004 | Medium |
| Task value-Metacognitive self-regulation | .43 | <.0004 | Medium |
| Task value-Help seeking | .43 | <.0004 | Medium |
| Self-efficacy-Metacognitive self-regulation | .43 | <.0004 | Medium |
| Self-efficacy-Time and study environment management | .42 | <.0004 | Medium |
| Extrinsic goal orientation-Effort regulation | .38 | <.0004 | Medium |
| Task value-Time and study environment management | .37 | <.0004 | Medium |
| Self-efficacy-Peer learning | .34 | <.0004 | Medium |
| Task value-Rehearsal | .34 | <.0004 | Medium |
| Self-efficacy-Help seeking | .34 | <.0004 | Medium |
| Intrinsic goal orientation-Metacognitive self-regulation | .33 | <.0004 | Medium |
| Intrinsic goal orientation- Time and study environment management | .33 | <.0004 | Medium |
| Intrinsic goal orientation-Help seeking | .33 | <.0004 | Medium |
| Extrinsic goal orientation-Rehearsal | .33 | <.0004 | Medium |
| Task value-Peer learning | .33 | <.0004 | Medium |
| Self-efficacy-Rehearsal | .32 | <.0004 | Medium |
| Extrinsic goal orientation-Peer learning | .31 | <.0004 | Medium |
| Intrinsic goal orientation-Organization | .30 | <.0004 | Medium |
| Self-efficacy-Effort regulation | .29 | <.0004 | Small |
| Extrinsic goal orientation-Help seeking | .26 | <.0004 | Small |

Among all of the subfactors of motivation and learning strategies parts of the
inventory, the "task value" and the "self-efficacy" subfactors are correlated
with all of the learning strategies subfactors, apart from this, the "help
seeking" subfactor are also associated with more subfactors than other
learning strategies subfactors (p<.0004).

**CONCLUSION**

The analyses gave the important results about subfactors of MSLQ. The results of one-way ANOVAs showed that there were no statistically significant differences among the scores of prospective biology teachers on MSLQ subfactors across the grade level. With the support of homogeneity evidence coming from one way ANOVAs, correlational analysis showed that subfactors of MSLQ, the "task value" (f=8), the "self-efficacy" (f=9) and the "help seeking" (f=4) subfactors are dominant subfactors of the whole scale. There are studies in line with the results of this study in terms of "task value" and "self-efficacy" subfactors (Pintrich, 1999, Pintrich and De Groot, 1990, Douglas, 2006).

The results of the study give important knowledge about class applications. The determination of "task value" and the "self-efficacy" aspects of motivation about any task or course should be made to get information about motivational state of students enrolled in departments of biology teacher education before courses begin. In addition to these, patterns of "help seeking" behavior in classes should be determined to provide more knowledge about obstacles in students' strategy use. The prediction of the states of students about other subfactors might be done by considering the states of students in terms of "task value", the "self-efficacy" and "help seeking" subfactors. In addition, common effective motivational factors among peers should be investigated to get information about differences in motivation for individual and peer interaction activities. The dominant strategies for prospective biology teachers should be analyzed for their motivational components. In addition, to determine aim and ways of use of help seeking strategies as deeper strategies might be a way to guidance for self-regulated learning.

The study is associational in nature and limited to 112 participants. Nonrandom nature of sample determination is other limitation of the study; therefore, generazibility of the results requires attention. The data gathering tool in the study is a self-report instrument, so there is a need to study with more comprehensive methods and tools. From this study, cause-effect relationship can not be explained, so there is need to study on dominant subfactors with the methods appropriate to explain cause-effect relationship.

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