

## **Metacognitive Strategies and Tendency to be Open to Learning: A Predictive Study<sup>1</sup>**

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The aim of the study was determining the openness to learning tendencies and metacognitive learning strategies and analysing the predictive relationships between the related variables. The predictive research model was used in the study. Within the research, 499 education faculty students participated. For data collection, “Metacognitive Learning Strategies Scale” and “Tendency to be Open to Learning Scale” were used. The collected data were analyzed using simple linear regression analysis and multiple linear regression analysis. Consequently, it was determined that students frequently use metacognitive learning strategies; their tendencies to be open to learning are at a high level. It was concluded that the tendency to be open to learning significantly predicted the total scores obtained from the metacognitive learning strategies scale. It was concluded that the most predicted variable by the predictive variables together was planning strategies, and the least predicted variable was evaluation strategies. These results show that openness to learning is a vital variable in activating metacognitive learning strategies.

*Keywords:* metacognitive learning strategies, learning tendency, tendency to be open to learning, teacher competencies, teacher education

### **Introduction**

The scientific, social, and technological developments experienced today lead to the change of knowledge and skills needed in different fields. With the pandemic process, which is one of these developments and affecting the world, some skills that impact the learning of individuals have come to the fore even more. These skills include the required qualities for individuals to cope with increasing knowledge in either face to face or online learning environments, evaluate the knowledge offered to them, and take responsibility for their own learning processes by exploring individual learning ways. A significant part of these skills needed in the learning process are gained through life-long learning experiences.

Lifelong learning process consists of learning activities that aim to improve individuals' personal, social, or professional knowledge, skills, and competencies throughout their lives (European Commission, 2002). Within the focus of life-long learning, there is the concept of learning more than teaching. In this context, learning is defined as a job that is triggered by good teaching and that the

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individual will do in accordance with the educational, social, and economic needs (Scales, Briddon, & Senior, 2013/2015). The learner characteristics that affect lifelong learning consist of individuals' attitudes, tendencies, and motivations towards learning and high-level thinking skills necessary for lifelong learning (Adams, 2007; Crow, 2006; Diker-Coşkun & Demirel 2012; OECD [Organisation for Economic Co-operation and Development], 2000; European Commission, 2002; Tan & Morris, 2005). The learning to learn skills among these characteristics require individuals to determine their own learning objectives, plan, monitor, and evaluate their learning process through these objectives (Adams, 2007; Knapper & Cropley, 2000). The learning to learn skills are seen as one of the most effective ways of supporting the lifelong learning of individuals in online and face-to-face education environments (Cornford, 2012).

## **Literature Review**

### **Metacognitive Learning Process**

It is seen that the concepts of metacognition, metacognitive skills, or metacognitive awareness are used to explain learning to learn skills. Flavell (1979) who used the metacognition concept, emphasizes an individual's knowledge about their own cognition and the use of this knowledge to follow and organize cognitive processes in explaining this process. In this sense, metacognitive knowledge includes individual's knowledge about self, knowledge regarding learning task, and knowledge about the necessary strategies for accomplishing this task successfully. The individuals using their metacognitive knowledge are expected to focus their attention, plan the task in detail, evaluate each step of the learning process, and doing the necessary reorganizations (Marzano et al., 1988). These kinds of activity require the application of metacognitive knowledge strategically to reach the learning objectives (Meijer, Veenman, & van Hout-Wolters, 2006; Schraw & Moshman, 1995) are conceptualized as metacognitive strategies. Within this context, individuals who realize the learning to learn process uses metacognitive strategies while organizing their own cognitive process.

When the concept of metacognitive learning strategies entered the literature of learning strategies, it was discussed together with cognitive strategies, but as a result of the conducted studies, the two strategy types were separated from each other (Namlu, 2004). Since, though cognitive and metacognitive strategies are closely related to each other, they have conceptually distinctive aspects (Cornford, 2012). Both cognitive and metacognitive strategies used in the learning process are goal-oriented, deliberately applied, effortful strategies (Schraw 1998). However, cognitive strategies are used to process the necessary knowledge to reach learning objectives. On the other hand, metacognitive strategies include activities involving questioning how and why this knowledge will be processed, understanding if the objectives are reached or not, and evaluation (Marzano et al., 1988).

It is observed that there are various classifications for metacognitive learning strategies in the literature. For example, Brezin (1980) classified metacognitive learning strategies into five basic categories which are planning, focusing and maintaining attention, analysis, revising, and evaluation. Jacobs and Paris, (1987) and Kluwe (1987) consider these strategies, which they conceptualize as metacognitive activities, in three groups. These strategies are planning, monitoring, and evaluating (cited in Schraw & Moshman, 1995). In the classification of Blakey and Spence (1990), there are three categories similarly defined as planning, monitoring, and evaluation. The metacognitive strategies in the measurement tool used in this study were grouped as planning, organizing, monitoring, and evaluation strategies (Namlu, 2004). When the metacognitive learning strategies used in the learning to learn process are evaluated, it is seen that planning, monitoring, and evaluation strategies are significantly emphasized strategies within the literature. Among the strategies, planning requires the determination of learning objectives that will guide monitoring the process and making a plan for these objectives (Marzano et al., 1988). Within the scope of this plan, there are activities such as determining the strategies suitable for the learning objective and predicting the planned time for the learning process (Meijer, Veenman, & van Hout-Wolters, 2006). On the other hand, monitoring strategies help individuals deliberately and consciously monitor and organize their own knowledge, processes, and emotional conditions regarding learning (Hacker, 1998). Learner through these strategies needs to make decisions about whether s/he has the necessary knowledge for learning, the difficulty of the task, and whether the understanding is achieved (Pintrich, Wolters, & Baxter, 2000). Evaluation strategies, it is aimed that individuals make judgments about activities conducted and products created in his/her learning process (Schraw & Moshman, 1995). The typical examples of an evaluation process include the learner's re-evaluating the objectives determined at the beginning of the process and reinforcing the cognitive attainments (Schraw, Crippen, & Hartley, 2006). In some occasions, reflection activities are used immediately after the evaluation process aiming to put forward the possible results of the learning experience for future cases (Meijer, Veenman, & van Hout-Wolters, 2006).

The planning, monitoring and evaluation strategies used in the learning-to-learn process are not independent from each other but enable the learning process to be organized interactively. For instance, individuals using metacognitive learning strategies should plan the required basic concepts for learning tasks beforehand. As for the learning process, it is necessary that individuals question whether they discriminate these concepts determined beforehand that should monitor the process. Individuals take the results reached based on these concepts under consideration for the next task showing that they use evaluation strategies (Namlu, 2004). Flavell (1979) distinguishes these strategies hierarchically and states that planning strategies are used before starting the task, monitoring strategies are used during the execution of the task, and evaluation strategies are used after the completion of the task.

## **Metacognitive Learning Strategies and Learning Tendencies**

In the use of metacognitive strategies in the learning process; several affective characteristics such as individuals' motivations, attitudes, beliefs and tendencies toward learning and thinking play an important role (Ang, Van-Dyne, & Koh, 2006; Buckingham-Shum & Deakin-Crick, 2012; Carr & Claxton, 2002). Learning tendency which composes the focus of this research consisted of three interacting elements. These elements are heading for the learning task or being motivated, being sensitive to the learning task and completing the learning task (Perkins, Jay, & Tishman, 1993). Generally, supportive learning tendencies in the acquisition of metacognitive strategies include individuals' being open to learning, ready, and willing to take advantage of learning opportunities (Carr & Claxton, 2002). In this line tendencies fed by the desires and motivations of individuals to take action, it is revealed in the actions they take in certain situations. For example, an individual with a curious tendency reflects this tendency by continuously asking questions and researching (Buckingham-Shum & Deakin-Crick, 2012). Among the learning and thinking tendencies; it has been determined that features such as mental flexibility, perseverance, openness to change, strategic awareness, willingness to take risks, open-mindedness, intellectual curiosity, and openness to learning come to the fore (Buckingham-Shum & Deakin-Crick, 2012; Carr & Claxton, 2002; Claxton, 2008; Perkins, Jay, & Tishman, 1993).

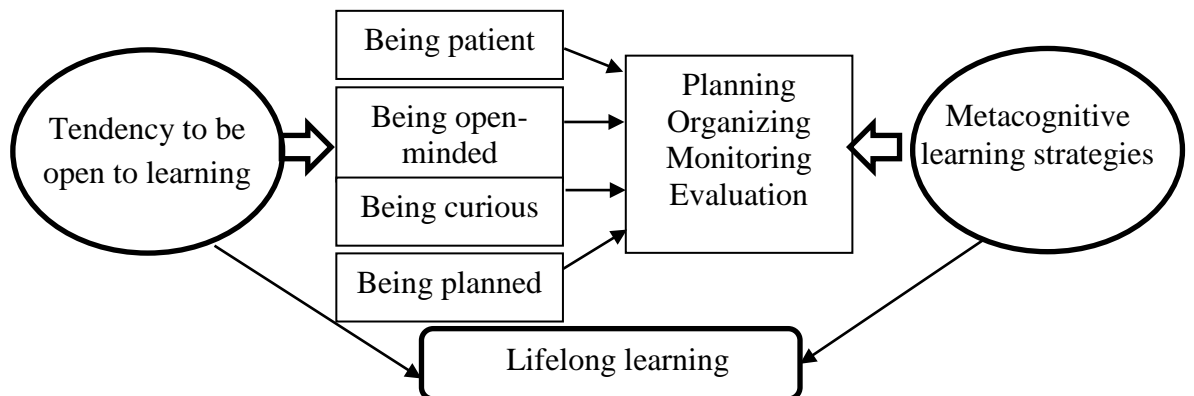
Being open to learning, which is among these tendencies and constitutes the independent variable of the research, is defined as learning the quality of thinking and knowledge while making judgments about events, reasons for events, and what needs to be done (Robinson, 2018). Openness to learning reflects actions embodying individuals' taking action about learning. Individuals establishing a continuous and developmental relationship with knowledge have motivation for learning (Türker, 2021). The tendency to be open to learning, on the other hand, requires the individual to be willing to be open to learning, to tend towards learning and to perform actions that reflect openness to learning, while making judgments about the quality of the learning process. It is indicated that individuals whose tendency to be open to learning is strong, are creative, prone to acculturation and mental development, curious, unique and open-minded, and artistically sensitive (Barrick & Mount, 1991). In the study by Tunca-Güçlü, Yeşilpınar-Uyar and Alkın-Şahin (2022), it was determined that there are four dimensions composing the tendency to be open to learning. These dimensions are; being patient, open-minded, curious, and planned.

Being patient generally necessitates students to struggle against the negative situations they faced and be insistent (Dweck, 1986; cited in Sideris, 2007). Individuals with the tendency for patience are expected to make an effort in their new learning experiences and situations require struggle (Tunca-Güçlü et al. 2022). The tendency to be open-minded is an important affective feature that requires an understanding approach to different ideas and perspectives and directs social relations and individual experiences (Meadows, 2006). In this sense, open-minded individuals should be politically, socially, and culturally unprejudiced, consider different perspectives in necessary situations (Tunca-Güçlü et al. 2022).

Curiosity is defined as the desire of individual for continuing to learn about fields of interest in a way developing his/her potential and contributing to society (Meadows, 2006). Individuals with a tendency to be curious are expected to search for interesting topics and problems to support formal and informal learning processes. The tendency for planning which is the last dimension of being open to learning involves preparing for the learning task by organizing conditions such as time management, setting, and materials required for the learning task (Tunca-Güçlü et al. 2022).

These dimensions are the characteristics associated with metacognitive learning strategies and lifelong learning tendencies. Since, in the lifelong learning process, individuals should be open to learning to be able to follow the developments in academic and occupational fields, keep up with these developments, and be success-oriented (Doğar, 2013; Kozikoğlu & Altunova, 2018). It is seen that individuals open to learning are more willing to participate in the learning experience, get more benefits from the learning experience (Barrick & Mount, 1991), and much easier adapt the developments related to social, economic, and political situations (Watters & Watters, 2007 cited in Türker, 2021). It is stated that the cognitive awareness of individuals who are prone to learning new things and willing to seek innovation and try, is also high (Ang, Van-Dyne, & Koh, 2006) and they are more successful in activating their metacognitive processes (Maurer & Shipp, 2021; Öztürk, 2021). Therefore, lifelong learning individuals should use metacognitive strategies effectively and be open to learning. It is considered that the tendency for being open to learning could be a significant variable supporting these strategies. Within this context, the metacognitive strategies required for the lifelong learning process and the tendency for being open to learning are the theoretical basis of the research. The relationships between these concepts are in Figure 1.

*Figure 1.* Tendency to be Open to Learning and Metacognitive Strategies in the Lifelong Learning Process



### The Need for Research/Rationale

Contemporary approaches adopted in the learning-teaching process required restructuring the meaning attributed to learning concept, learning and teacher

roles, and the characteristics of the learning environment in line with the needs of the age. In this process, it is aimed to raise individuals who are open to learning and innovations, who make sense of the presented information by establishing a relationship with their prior learning, and who use the information they make sense of in a creative way in new situations (Wiske, Sick, & Wirsig, 2001). Individuals who show cognitively active participation in learning activities should acquire the necessary metacognitive skills to take responsibility for their own learning and thinking processes (OECD, 2019).

These features among the 21<sup>st</sup>-century learning skills directly affect the competencies teachers should possess. Teachers responsible for guiding the learning process, are expected to consider students' individual differences, plan, apply, and evaluate activities for gaining metacognitive skills (Marzano et al. 1988). Teachers' organizing this kind of activities requires their being open to learning and professional development, and undertaking their own learning responsibilities (Ang, Van-Dyne, & Koh, 2006; Askill-Williams, Lawson, & Skrzypiec, 2012). Professional development opportunities provided for teachers are seen as very important for the acquisition of these features regarding the organization of metacognitive processes (Bredeson, 2002).

Pre-service teacher education plays a fundamental role in providing reflective learning experiences necessary for professional development. In this context, it should be aimed to train teachers who are open to learning and development and have metacognitive skills through qualified pre-service teacher education programs structured in line with the needs of the age. It is necessary to examine the skills and tendencies of pre-service teachers in a relational and multidimensional structure in order to determine the extent to which the programs serve this purpose and to organize them considering the current needs.

In related literature, it is observed that the metacognitive awareness of pre-service teachers and the metacognitive strategies they use have been analyzed in terms of different variables (Alkan & Erdem, 2012; Ay & Baloğlu-Uğurlu, 2016; Baykara-Özaydınlık, 2018; Deniz, 2015; Güven & Çevik-Kılıç, 2021; Tümen-Akyıldız & Donmuş-Kaya, 2021; Zhang & Seepho, 2013). Within the other research related to the topic, it is determined that the lifelong learning tendencies of pre-service teachers have been examined (Bilici & Bağcı, 2020; Bulaç & Kurt, 2019; Demir & Doğanay, 2019; Yenice & Alpak-Tunç, 2019; Pilli, Sönmezler & Gökten, 2017; Receptoğlu, 2021). These studies present significant data for the description of these variables. However, limited number of studies, in which the tendency to be open to learning was examined as a sub-dimension of attitude towards learning, were reached (Yavuz-Konokman & Yanpar-Yelken, 2014). Besides, no study was found that analyzed the tendency to be open to learning and metacognitive learning strategies.

In this study conducted based on this requirement, it was aimed to determine the tendency to be open to learning and metacognitive learning strategies of the students in the faculty of education, to analyze the predictive relationships between related variables. With respect to this aim, the answers for the research questions below were sought.

- What is the level of students' metacognitive learning strategies?
- What is the level of students' tendency to be open to learning?
- Does the tendency of students to be open to learning significantly predict the total scale scores of metacognitive learning strategies?
- Which of the sub-dimensions of the tendency to be open to learning significantly more predict the total scale and subscale scores of metacognitive learning strategies?

## **Methodology**

### **Research Design**

Predictive research design was used within the study. The predictive (independent) variables of the research were tendency to be open to learning and the being patient, open-minded, curious and planned tendencies forming it. The predicted (dependent) variables of the study were metacognitive learning strategies and the planning, organizing, monitoring, and evaluating strategies composing them.

### **Study Group**

The population of the study consisted of students in the faculty of education at a university in the western part of Turkey. The sample of the study consisted of 499 students determined by disproportionate cluster sampling among this population. The 79.40% of the students in the sample were women and 20.60% were men. 51.10% of the students were freshmen, 48.90% were seniors. The 24.80% of students were early childhood education, 21% were primary education, 15.80% Turkish education, 15.60% social sciences education, 10.40% science education, 12.20% primary mathematics education program students.

### **Data Collection**

In data collection, Metacognitive Learning Strategies Scale developed by Namlu (2004) and Tendency to be Open to Learning Scale developed by Tunca-Güçlü et al. (2022). Metacognitive learning strategies scale is a 4-Likert type tool consisting of planning, organizing, monitoring, and evaluating sub-dimensions and 21 items. The total variance in the scale explained is 44.70%. Cronbach Alpha internal consistency coefficients regarding sub-dimensions of the scale are varying between .51-.83. Cronbach Alpha internal consistency coefficient for the whole scale is .89. Within this study, Cronbach Alpha internal consistency coefficients were determined as .86 for the total scale, .68 for planning subscale, .83 for organizing subscale, .79 for monitoring subscale and .51 for evaluating subscale.

Tendency to be Open to Learning Scale is a 5-Likert type tool with 22 items consisting of being patient, open-minded, curious, and planned subscales. The total variance explained by the scale is 49.31%. The Cronbach Alpha internal

consistency coefficients for the sub-dimensions of the scale ranged from .64 to .84. The Cronbach Alpha internal consistency coefficient for the entire scale is .85. The Cronbach Alpha internal consistency coefficients in this study were determined as; .87 for the whole scale, .83 for being patient subscale; .82 for being open-minded and .74 for being curious, .81 for being planned subscale.

## Data Analysis

Simple linear regression analysis and multiple linear regression analysis were used in the analysis of the data. Within the preparation of the data for simple linear regression analysis, the normal distribution characteristics regarding the scores of dependent and independent variables were checked by determining the kurtosis and skewness coefficients. In this study, it has been determined that the kurtosis and skewness coefficients of the variables varied between -1 and +1, and the values obtained by dividing the skewness and kurtosis coefficients by their own standard errors were between -1.96 and +1.96. Thus, it was found that the scores of predictive and predicted variables showed normal distribution. In addition, correlation analysis was utilized for testing the linear relation between dependent and independent variables, it was determined that there was a moderately significant relationship ( $r=.60$ ) between these variables.

In the process of preparing the data for multiple linear regression analysis, the multivariate normal distribution characteristics of the scores of the dependent and independent variables were checked with a scatter plot. The elliptical shape of the resulting graphs showed that the multivariability normality assumption was met. The linear relationship between predictive variables and each dependent variable included in the analysis was tested by correlation analysis and it was determined that there were moderately and low significant relationships between predictive variables in line with indicated values in Table 1. When examining whether there is a multicollinearity between the independent (predictive) variables; VIF values were determined as  $<10$ ; TO (tolerance) values were determined as  $>.10$  and CI (Condition Index) values were determined as  $<30$  and it was determined that there was no multicollinearity problem. Durbin Watson coefficients calculated to detect autocorrelation were found as; 2.09; 1.89; 2.11, 1.90, and 1.91. That the values were between 1.50 and 2.50 indicated that there was no autocorrelation in the data set.

While the scores of the metacognitive learning strategies scale and the tendency to be open to learning scale were interpreted, the weighted average values were calculated. Mean values regarding the scores obtained from metacognitive learning strategies scale and subscales were interpreted as “between 1.00-1.75 never”; “between 1.76-2.50 sometimes”; “between 2.51-3.25 often” and “between 3.26-4.00 always”. On the other hand, mean values for the scores got from tendency to be open to learning scale and subscales were interpreted as “between 1.00-1.80 very low”; “between 1.81-2.60 low”; “between 2.61-3.40 moderate”; “between 3.41-4.20 high”; “between 4.21-5.00 very high”. The significance level of .05 was taken as a criterion in interpreting whether the results were significant or not.



## Results

### Descriptive Statistics and Correlation Values Regarding Predictive and Predicted Variables

The descriptive values and correlation values obtained in line with the first and second questions of the research are presented in Table 1.

*Table 1.* Metacognitive Learning Strategies Total and Subscale Scores and Mean, Standard Deviation and Correlation Values for Predictive Variables

Predicted Variables	N	X	Sd	1	2	3	4	5
MLST	499	2.67	.43	.600*	.508*	.225*	.371*	.581*
Planning strategies	499	.67	.15	.478*	.427*	.110*	.229*	.555*
Organizing strategies	499	.79	.18	.514*	.388*	.192*	.335*	.539*
Monitoring strategies	499	.71	.13	.452*	.419*	.266*	.302*	.284*
Evaluation strategies	499	.47	.10	.327*	.279*	.098*	.243*	.311*
<b>Predictive Values</b>								
1.TOLT	499	3.79	.48	-	.823*	.677*	.667*	.656*
2. Being patient	499	1.17	.20		-	.399*	.439*	.418*
3. Being open-minded	499	1.07	.18			-	.362*	.130*
4. Being curious	499	.71	.12				-	.270*
5. Being planned	499	.83	.18					-

\* p<.01

MLST (Metacognitive learning strategies total)

TOLT (Tendency to be open to learning total)

The mean of the predicted variables in Table 1 for the MLST score was 2.67; the standard deviation value was determined to be .43. It was seen that means for subscales ranged between .47-.79, while standard deviation values varied between .10 and .18. The mean for MLST score shows that students frequently use metacognitive learning strategies. It was determined that mean for TOLT score from predictive variables was 3.79; the standard deviation was .48. It was seen that the means of the subscales were between .71 and 1.17; the standard deviations varied between .12 and .20. The mean value for TOLT shows that the tendencies of the students to be open to learning are at high level. It was determined that the variables of being patient, being curious, being open-minded, and being planned, which constitute the dimensions of the tendency to be open to learning, were in a moderate and low-level significant relationship with the predicted variables. Again, it is seen that there is a moderate and low-level significant relationship between the predictive variables.

### Inferential Statistics Regarding Predictive and Predicted Variables

In this section, inferential statistical results related to the scores obtained from the metacognitive learning strategies scale and its sub-dimensions are presented and explained under sub-headings.

#### The Prediction Level of the Metacognitive Learning Strategies Total Score of the Tendency to be Open to Learning

Simple linear regression analysis results obtained through the third research question are presented in Table 2.

Table 2. Simple Linear Regression Analysis Results on Metacognitive Learning Strategies and the Variables of Tendency to be Open to Learning

Variable	B	Standard Error B	$\beta$	t	p
Constant (MLS)	13.151	2.591	-	5.076	.00
TOL	.515	.031	.600	16.704	.00
R= .600 R2=.36 Adjusted R2= .36 F(1-497)= 279.022					

MLS (Metacognitive learning strategies)

TOL (Tendency to be open to learning)

It was determined that students' TOL total scores significantly predicted MLS scores as a result of simple linear regression analysis in Table 2 (R=.60. R2=.36. F=279.02. p<.01). It is seen that students' tendencies to be open to learning significantly explain 36% of the change in metacognitive learning strategies.

#### Prediction Level of Metacognitive Learning Strategies Total and Subscale Scores of Sub-Dimensions of Openness to Learning

The results regarding the level that predictive variables constituting tendency to be open to learning predicts MLS total score were presented in Table 3.

Table 3. Multiple Regression Analysis Results Regarding Metacognitive Learning Strategies Scale Total Score and Predictive Variables

Variable	B	Standard Error B	$\beta$	t	p	Zero-order r	Partial r
Constant (MLS)	15.351	2.467	-	6.224	.00	-	-
2.Being patient	.550	.088	.262	6.258	.00	.508	.271
3.Being open-minded	.035	.087	.015	.405	.69	.225	.018
4.Being curious	.455	.132	.134	3.452	.00	.371	.153
5.Being planned	1.011	.087	.434	11.588	.00	.581	.462
R= .662 R2=.44 Adjusted R2= .43 F(4-494)= 96.37 p= .000							

According to the multiple linear regression analysis results in Table 3; it was determined that the tendencies of being patient, open-minded, curious, and planned were in a significant relationship with MLS total scale scores. The four

stated predictive variables significantly explain 44% of the total variance within MLS scores ( $R=.662$ .  $R^2= .44$   $p<.01$ ). According to standardized regression coefficients ( $\beta$ ), predictive variables' relative order of importance is being planned, being patient, being curious and being open-minded. When the t test results regarding the significance of the regression coefficients are examined; it is seen that the tendencies to be planned, to be patient and to be curious are significant predictors of metacognitive learning strategies ( $p<.01$ ), while the tendency to be open-minded is not a significant predictor of metacognitive learning strategies ( $p=.69>.05$ ). The results regarding the level of predictive variables of planning strategies are presented in Table 4.

*Table 4.* Multiple Regression Analysis Results on Planning Strategies Subscale Score and Predictive Variables

Variable	B	Standard Error B	$\beta$	t	p	Zero-order r	Partial r
Constant (Planning)	4.040	.921	-	4.388	.00	-	-
2.Being patient	.186	.033	.254	5.663	.00	.427	.247
3.Being open-minded	-.044	.032	-.055	-1.362	.17	.110	-.061
4.Being curious	.018	.049	.015	.372	.71	.229	.017
5.Being planned	.368	.033	.452	11.292	.00	.555	.453
R= .597                      R <sup>2</sup> =.36                      Adjusted R <sup>2</sup> = .35							
F(4-494)= 68.52                      p= .00							

According to the multiple linear regression analysis results in Table 4; it has been determined that the tendencies of being patient, being open-minded, being curious, and being planned are in a significant relationship with the planning strategies subscale scores. The stated four predictive variables significantly explain 36% of the total variance within planning strategies scores ( $R=.597$ .  $R^2= .36$   $p<.01$ ). With regard to the standardized regression coefficients ( $\beta$ ), the relative importance order of the predictor variables on planning strategies is as; tend to be planned, patient, curious, and open-minded. When the t test results regarding the significance of the regression coefficients are examined; it is seen that the tendencies of being planned and being patient are significant predictors of planning strategies ( $p<.01$ ), while the tendencies of being curious and being open-minded are not significant predictors of planning strategies ( $p=.71$ ;  $p=.17>.05$ ). The results on prediction level of predictive variables for organizing strategies are presented in Table 5.

Table 5. Multiple Regression Analysis Results on Organizing Strategies Subscale Score and Predictive Variables

Variable	B	Standard Error B	$\beta$	t	p	Zero-order r	Partial r
Constant (Organizing)	1.823	1.111	-	1.641	.10	-	-
2. Being patient	.110	.040	.126	2.778	.01	.388	.124
3. Being open-minded	.029	.039	.030	.741	.46	.192	.033
4. Being curious	.211	.059	.149	3.560	.00	.335	.158
5. Being planned	.430	.039	.443	10.944	.00	.539	.442
R= .586      R2=.34      Adjusted R2= .34 F(4-494)= 66.61      p= .000							

In line with the multiple regression analysis results in Table 5, it has been put forward that tendencies to be patient, open-minded, curious, and planned are in a significant relationship with organizing strategies subscale scores. The four predictive variables explain 34% of the total variance in organization strategies scores ( $R=.586$ .  $R^2= .34$   $p<.01$ ). According to the standardized regression coefficients ( $\beta$ ), the relative importance order of the predictive variables on organizing strategies is the tendencies to be planned, patient, curious, and open-minded. Analyzing the t test results regarding the significance of regression coefficients, it is seen that being planned, patient and curious tendencies are significant predictors on organizing strategies ( $p<.05$ ) whereas the tendency to be open-minded is not a significant predictive on organizing strategies ( $p=.46>.05$ ). The results regarding the level predictive variables predict monitoring strategies are shown in Table 6.

Table 6. Multiple Regression Analysis Results on Monitoring Strategies Subscale Score and Predictive Variables

Variable	B	Standard Error B	$\beta$	t	p	Zero-order r	Partial r
Constant (Monitoring)	5.054	.909	-	5.558	.00	-	-
2. Being patient	.182	.032	.279	5.624	.00	.419	.245
3. Being open-minded	.070	.032	.098	2.197	.03	.266	.098
4. Being curious	.116	.049	.110	2.392	.02	.302	.107
5. Being planned	.091	.032	.125	2.826	.01	.284	.126
R= .460      R2=.21      Adjusted R2= .21      F(4-494)= 33.17      p= .000							

With regard to multiple linear regression analysis results in Table 6; it has been identified that tendencies to be patient, open-minded, curious, and planned are in a significant relationship with monitoring strategies subscale scores. Mentioned four predictive variables explain 21% of the total variance in monitoring strategies ( $R=.460$ .  $R^2= .21$   $p<.01$ ). According to standardized

regression coefficients ( $\beta$ ), the relative importance order of predictive variables on monitoring strategies is as; tendency to be patient, planned, curious and open-minded. When the t test results regarding the significance of the regression coefficients are examined; it is seen that the tendencies of being patient, being open-minded, being curious, and being planned are significant predictors of the monitoring strategies ( $p < .05$ ). The results regarding the prediction level of the predictive variables for the evaluation strategies are presented in Table 7.

Table 7. Multiple Regression Analysis Results on Evaluation Strategies Subscale Score and Predictive Variables

Variable	B	Standard Error B	$\beta$	t	p	Zero-order r	Partial r
Constant (Evaluation)	4.434	.732	-	6.058	.00	-	-
2. Being patient	.072	.026	.143	2.764	.01	.279	.123
3. Being open-minded	-.020	.026	-.036	-.775	.44	.098	-.035
4. Being curious	.109	.039	.134	2.792	.01	.243	.125
5. Being planned	.122	.026	.219	4.726	.00	.311	.208
R= .370      R <sup>2</sup> =.14      Adjusted R <sup>2</sup> = .13      F(4-494)= 19.64      p= .000							

According to the multiple linear regression analysis results in Table 7; it has been found out that the tendencies of being patient, being open-minded, being curious, and being planned are in a significant relationship with the evaluation strategies subscale scores. Four predictive variables significantly explain about 14 percent of the total variance in evaluation strategies scores ( $R = .370$ ,  $R^2 = .14$ ,  $p < .01$ ). Up to the standardized regression coefficients ( $\beta$ ), the relative importance order of predictive variables on evaluation strategies is tendencies to be planned, patient, curious and open-minded. Examining the t test results regarding the significance of the regression coefficients it is seen that the tendencies to be planned, to be patient and to be curious are significant predictors of evaluation strategies ( $p < .001$ ), while the tendency to be open-minded is not a significant predictor of evaluation strategies ( $p = .44 > .05$ ).

## Discussion

It was aimed to determine tendencies to be open to learning (TOL) and metacognitive learning strategies (MLS) of students at faculty of education and analyze predictive relationships between related variables. The obtained descriptive statistics results within the study show that students frequently use metacognitive learning strategies, and tendencies to be open to learning are at a high level. Also in the studies metacognitive learning process and cognitive awareness strategies were analyzed, it was determined that teachers and pre-service teachers frequently use cognitive awareness strategies (Ay & Baloğlu-Uğurlu, 2016; Baykara-Özaydınlık, 2018; Deniz, 2015; Güven & Çevik-Kılıç, 2021; Tümen-Akyıldız & Donmuş-Kaya, 2021; Zhang & Seepho, 2013), that cognitive awarenesses and learning to learn competencies are at high level (Alkan

& Erdem, 2012; Durmuşçelebi & Kuşuçuran, 2018). In the literature, no studies on the tendency to be open to learning were analyzed, have been found. On the other hand, in the research of Yavuz-Konokman and Yanpar-Yelken (2014), openness to learning as a sub-dimension of the attitude toward learning was examined and it was determined that the level of being open to learning of pre-service teachers was above the average. In other studies in the literature, it is seen that lifelong learning tendencies, which include dimensions related to being open to learning, are examined. The results of these studies show that pre-service teachers have a high level of lifelong learning tendencies (Bilici & Bağcı, 2020; Bulaç & Kurt, 2019; Yenice & Alpak-Tunç, 2019; Pili, Sönmezler, & Gökten, 2017; Receptoğlu, 2021). It is seen that these results reached through the literature support the study's results.

In the results of regression analysis; it was found out that tendency to be open to learning significantly predicts MLS total scores. It is seen that the tendency to be open to learning significantly explains 36% of the change in MLS. It was determined that being planned, patient and curious tendencies forming the tendency to be open to learning are significant predictors on MLS, the tendency to be open-minded is not a significant predictor on MLS. According to this, it is seen that a significant part of the total variability in the metacognitive learning strategies of pre-service teachers stems from their tendency to be open to learning. These results show that being open to learning is a crucial variable in activating metacognitive learning strategies.

Considering the theoretical framework, these expected results are difficult to discuss in terms of empirical research findings. Because there is no study in the literature directly examining the relationship between the tendency to be open to learning and metacognitive learning strategies. However, although the study groups vary, there are studies proving that metacognitive learning strategies and cognitive awareness skills show a significant relationship with critical thinking skills and tendencies (Amin, Corebima, Zubaidah, & Mahanal, 2020; Durmuşçelebi & Kuşuçuran, 2018; Demir & Kaya, 2015; Sadeghi, Hassani, & Rahmatkhah, 2014; Sepahvand, vd., 2017), openness to experience (Ang, Van-Dyne, & Koh, 2006; Öztürk, 2021; Sepahvand vd., 2017; Soliemanifar, Behroozi, & Moghaddam, 2015) and lifelong learning tendencies (Demir & Doğanay, 2019). Öztürk's (2021) research results also show that openness to experience, which is defined as a personality trait, significantly predicts metacognitive knowledge and metacognitive regulation within the scope of cognitive awareness. These results indirectly support the study's findings.

Examining regression analysis results in terms of predictive variables, tendencies to be patient and planned were found to be significantly predicting the whole metacognitive learning strategies. In the other results obtained, it was detected that the tendency to be open-minded is not a significant predictor on MLS total score and planning, organizing, and evaluating strategies while the tendency to be curious is not a significant predictor on planning strategies. This result puts forward that tendency to be open-minded only effective in activating monitoring strategies. When the related literature has been analyzed, it is seen that tendencies to be open-minded and curious are also included within the scope of critical

thinking tendencies (Facione, 1990; Facione, Facione, & Giancarlo, 2000; Merma-Molina, Gavilan-Martin, & Urrea-Solano, 2022). The results of the studies concerning the issue show that there is a significant relationship between critical thinking tendencies and metacognitive skills (Sadeghi et al., 2014; Sepahvand, et al., 2017; Soliemanifar et al., 2015). However, that tendencies to be open-minded and curious are not significant predictors on some metacognitive strategies in this study differs from the results in the literature. Open-mindedness is an important affective feature that requires being sensitive to various views and considering different perspectives in encountered situations (Insight Assessment, 2017). It is stated that open-minded individuals focus on the whole, they adhere to the principles of rationality while making decisions about the solution of problems, they change their views when the evidence is sufficient, and they tend to seek certainty about the solution (Ennis, 1985; Bailin, Case, Coombs, & Daniels, 1999). Since this situation requires questioning the alternatives before making a decision, it is easier for open-minded individuals to reach the foreseen goals (Merma-Molina et al., 2022). Within the scope of the open-mindedness subscale used in the research, some items necessitate questioning and controlling prejudices to consider different perspectives (Tunca-Güçlü et al., 2022). In this context, affective processes that tend to be open-minded should be monitored, questioned, and controlled. Monitoring strategies in the context of metacognitive strategies are also related to monitoring the process regarding making sense of information, comparing different types of information needed in the learning process, and questioning this information by comparing it with prior knowledge (Namlu, 2004). In this sense, it is observed that monitoring and deciding activities form the basis for the monitoring process (Hertzog & Dunlosky, 2011). Therefore, it is necessary to question and monitor affective processes within the tendency to be open-minded and to monitor and control cognitive processes in monitoring strategies. The tendency to be open-minded is only a significant predictor of monitoring strategies can be associated with the prominence of monitoring and control mechanisms among the main purpose of both variables.

Being curious, another predictive variable of the study reflects the tendency to get new information independent from any expectation and learn new things (Kökdemir, 2003). According to Berlyne's (1954; 1960) curiosity theory, there are two types of curiosity as perceptual and epistemic curiosity. It is stated that there are two types of epistemic curiosity related to learning and memory characteristics, as specific and diverse. While specific curiosity includes in-depth research on a specific topic, diverse curiosity shows itself as a general research-analysis behavior (cited in Fulcher, 2004). In this sense, it is seen that attractive situations are handled in a more general and broader framework through diverse curiosity while in specific curiosity the tendency to seek depth in searching for information is at the forefront. The items in the tendency to be curious subscale are associated with turning to topics that they find interesting and worth researching to support formal and informal learning processes (Tunca-Güçlü et al., 2022). In the dimension of planning, one of the metacognitive strategies, individuals are expected to carry out preparatory work on a subject to be learned. In this context, while in-depth examination of research areas developing the potential of

individual within the tendency to be curious comes to the fore (Meadows, 2006), planning strategies require the determination of learning objectives that would guide the monitoring the process based on the subject and planning for these objectives (Marzano et al., 1988). In this process, there are activities such as determining the strategies suitable for the learning purpose and predicting the planned time for the learning process (Meijer, Veenman, & van Hout-Wolters, 2006). It is seen that planning strategies are mostly related with specific curiosity a type of epistemic curiosity, in this context, individuals should handle the information they found worth researching with an in-depth understanding. However, the tendency to be curious was not a significant predictor on planning strategies within the study could be due to pre-service teachers' perceiving curiosity as a general research-analysis behavior. In a study conducted with university students, it was found out that students tended to different issues other than analyzing the information in-depth and their curiosity tendencies do not show continuity (Demirel & Diker-Çoşkun, 2009). Besides, it is indicated that curiosity has dynamics differ in individualist and collectivist societies and sensitive to cultural differences (Acun, Kapkiran & Kabasakal, 2013; Aschieri, Durosini, & Smith, 2020). These results reached within the literature; support the view that the tendency to be curious not being a significant predictor on planning strategies could be associated with sample characteristics.

The regression results regarding predicted variables indicate that four predictive variables forming TOL significantly explain 36% of the change in planning strategies, 34% of the change in organizing strategies, 21% of the change in monitoring strategies, and 14% of the change in evaluation strategies. Within this scope, it was put forward that the most predicted variable by the tendency to be open to learning together is planning strategies, and the least predicted variable is evaluation strategies. Planning one of these strategies; includes activities regarding the preparation of necessary conditions for learning. In organizing strategies, the necessary topics and key concepts for mental preparation for the learning task should be arranged according to metacognitive schemes. While monitoring and controlling the learning process is necessary for monitoring strategies; evaluation strategies involve the activities that require an individual to decide the effectiveness of his/her learning process (Namlu, 2004). Flavell (1979) distinguishes these strategies hierarchically and states that planning strategies are used before starting the task, monitoring strategies are used during the execution of the task, and evaluation strategies are used after the completion of the task. In this sense, it is seen that there is a hierarchical, interactive, and systematic structure between planning, organizing, monitoring, and evaluation strategies used in metacognitive processes.

It was found out that also the power of tendencies to be open to learning predict metacognitive strategies decrease in a systematic structure from planning strategies towards evaluation strategies. This shows that individuals open to learning more tend to use strategies to plan the learning task and structure mental processes. However, it is obvious that this tendency does not show a stable structure; relatively decrease in monitoring and evaluating metacognitive processes. The results of different studies supporting this view; indicate that higher education



students use planning and organizing strategies more than monitoring and evaluation strategies (Baykara-Özaydınlık, 2018; Deniz, 2015; Güven & Çevik-Kılıç, 2021; Namlu, 2004; Langdon et al., 2019; Yang, 2009; Yılmaz & Baydas, 2017; Zhang & Seepho, 2013). In Diker-Coşkun and Demirel's (2012) study, it was determined that higher education students are making an effort to participate in lifelong learning activities, but they are not determined to conclude their optional learning situations. These results obtained are seen to support the findings of the study.

### Conclusions and Implications

Consequently, it was found out that students frequently use metacognitive learning strategies, and their tendencies to be open to learning are at a high level. It was concluded that the tendency to be open to learning significantly predicts the total scores got from the metacognitive learning strategies scale. That the tendencies to be patient and planned significantly predict all of the metacognitive learning strategies was put forward. It was detected that the tendency to be open-minded is not a significant predictor on planning, organizing, and evaluation strategies while the tendency to be curious is not a significant predictor on planning strategies. It was concluded that the most predicted variable by the predictive variables together was planning strategies, and the least predicted variable was evaluation strategies.

That tendency to be open to learning significantly predicts metacognitive strategies show that teaching practices supporting being open to learning are needed in gaining these strategies. In this sense, primarily affective features reflecting tendencies to be planned, patient, curious, and open-minded should be included in the objectives of teacher education. The content for these purposes should be supported with intriguing elements, interesting and controversial topics.

It is suggested to use activities that require in-depth research of the content from different sources, questioning and evaluating the content reached to integrate these goals and content with metacognitive strategies. That the variables the least predicted by the dimensions forming the tendency to be open to learning are evaluation strategies indicates that is necessary to increase the activities focused on evaluating and reflecting the learning task in teacher education programs. In line with this, it is recommended that students monitor the learning tasks they are responsible for, this process should be supported by practices in which student decisions and their reflections are evaluated. It is thought that evaluation tools such as self-evaluation forms, peer evaluation forms, reflective letters, and diaries that can be used within the scope of formative practices will also contribute to the development of pre-service teachers' reflective thinking skills.

These obtained results are limited to data gathered from students studying in the faculty of education. In this context, descriptive and predictive studies can be conducted to examine the tendency of teachers to be open to learning and the metacognitive strategies they use. In addition to this, it is considered that qualitative and mixed design research examining the relationship of tendencies to

be open-minded and curious with the metacognitive learning process in-depth were necessary.

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