

1 **Metacognitive Strategies and Tendency to be Open to** 2 **Learning: A Predictive Study**

3
 4 *The aim of the study was determining the openness to learning tendencies and*
 5 *metacognitive learning strategies and analysing the predictive relationships*
 6 *between the related variables. The predictive research model was used in the*
 7 *study. Within the research, 499 education faculty students participated. For*
 8 *data collection, “Metacognitive Learning Strategies Scale” and “Tendency to*
 9 *be Open to Learning Scale” were used. The collected data were analyzed using*
 10 *simple linear regression analysis and multiple linear regression analysis.*
 11 *Consequently, it was determined that students frequently use metacognitive*
 12 *learning strategies; their tendencies to be open to learning are at a high level. It*
 13 *was concluded that the tendency to be open to learning significantly predicted*
 14 *the total scores obtained from the metacognitive learning strategies scale. It*
 15 *was concluded that the most predicted variable by the predictive variables*
 16 *together was planning strategies, and the least predicted variable was*
 17 *evaluation strategies. These results show that openness to learning is a vital*
 18 *variable in activating metacognitive learning strategies.*

19
 20 **Keywords:** *Metacognitive learning strategies, learning tendency, tendency to*
 21 *be open to learning, teacher competencies, teacher education*

22 **Introduction**

23
 24
 25
 26 The scientific, social, and technological developments experienced today lead
 27 to the change of knowledge and skills needed in different fields. With the
 28 pandemic process, which is one of these developments and affecting the world,
 29 some skills that impact the learning of individuals have come to the fore even
 30 more. These skills include the required qualities for individuals to cope with
 31 increasing knowledge in either face to face or online learning environments,
 32 evaluate the knowledge offered to them, and take responsibility for their own
 33 learning processes by exploring individual learning ways. A significant part of
 34 these skills needed in the learning process are gained through life-long learning
 35 experiences.

36 Lifelong learning process consists of learning activities that aim to improve
 37 individuals' personal, social, or professional knowledge, skills, and competencies
 38 throughout their lives (European Commission, 2002). Within the focus of life-long
 39 learning, there is the concept of learning more than teaching. In this context,
 40 learning is defined as a job that is triggered by good teaching and that the
 41 individual will do in accordance with the educational, social, and economic needs
 42 (Scales, Briddon & Senior, 2013/2015). The learner characteristics that affect
 43 lifelong learning consist of individuals' attitudes, tendencies, and motivations
 44 towards learning and high-level thinking skills necessary for lifelong learning
 45 (Adams, 2007; Crow, 2006; Diker-Coşkun & Demirel 2012; OECD [Organisation
 46 for Economic Co-operation and Development], 2000; European Commission,
 47 2002; Tan & Morris, 2005). The learning to learn skills among these

1 characteristics require individuals to determine their own learning objectives, plan,
 2 monitor, and evaluate their learning process through these objectives (Adams,
 3 2007; Knapper & Cropley, 2000). The learning to learn skills are seen as one of
 4 the most effective ways of supporting the lifelong learning of individuals in online
 5 and face-to-face education environments (Cornford, 2012).

8 **Literature Review**

10 **Metacognitive Learning Process**

11
 12 It is seen that metacognition, metacognitive skills, or metacognitive awareness
 13 concepts in the explanation of learning to learn skills. Flavell (1979) who used the
 14 metacognition concept, emphasizes an individual's knowledge about their own
 15 cognition and the use of this knowledge to follow and organize cognitive
 16 processes in explaining this process. In this sense, metacognitive knowledge
 17 includes individual's knowledge about self, knowledge regarding learning task,
 18 and knowledge about the necessary strategies for accomplishing this task
 19 successfully. The individuals using their metacognitive knowledge are expected to
 20 focus their attention, plan the task in detail, evaluate each step of the learning
 21 process, and doing the necessary reorganizations (Marzano et al., 1988). These
 22 kinds of activity require the application of metacognitive knowledge strategically
 23 to reach the learning objectives (Meijer, Veenman & van Hout-Wolters, 2006;
 24 Schraw & Moshman, 1995) are conceptualized as metacognitive strategies. Within
 25 this context, individuals who realize the learning to learn process uses
 26 metacognitive strategies while organizing their own cognitive process.

27 When the concept of metacognitive learning strategies entered the literature of
 28 learning strategies, it was discussed together with cognitive strategies, but as a
 29 result of the conducted studies, the two strategy types were separated from each
 30 other (Namlu, 2004). Since, though cognitive and metacognitive strategies are
 31 closely related to each other, they have conceptually distinctive aspects (Cornford,
 32 2012). Both cognitive and metacognitive strategies used in the learning process are
 33 goal-oriented, deliberately applied, effortful strategies (Schraw 1998). However,
 34 cognitive strategies are used to process the necessary knowledge to reach learning
 35 objectives. On the other hand, metacognitive strategies include activities involving
 36 questioning how and why this knowledge will be processed, understanding if the
 37 objectives are reached or not, and evaluation (Marzano et al., 1988).

38 It is observed that there are various classifications for metacognitive learning
 39 strategies in the literature. For example, Brezin (1980) classified metacognitive
 40 learning strategies into five basic categories which are planning, focusing and
 41 maintaining attention, analysis, revising, and evaluation. Jacobs and Paris, (1987)
 42 and Kluwe (1987) consider these strategies, which they conceptualize as
 43 metacognitive activities, in three groups. These strategies are planning,
 44 monitoring, and evaluating (cited in Schraw & Moshman, 1995). In the
 45 classification of Blakey and Spence (1990), there are three categories similarly
 46 defined as planning, monitoring, and evaluation. The metacognitive strategies in

1 the measurement tool used in this study were grouped as planning, organizing,
2 monitoring, and evaluation strategies (Namlu, 2004). When the metacognitive
3 learning strategies used in the learning to learn process are evaluated, it is seen that
4 planning, monitoring, and evaluation strategies are significantly emphasized
5 strategies within the literature. Among the strategies, planning requires the
6 determination of learning objectives that will guide monitoring the process and
7 making a plan for these objectives (Marzano et al., 1988). Within the scope of this
8 plan, there are activities such as determining the strategies suitable for the learning
9 objective and predicting the planned time for the learning process (Meijer,
10 Veenman & van Hout-Wolters, 2006). On the other hand, monitoring strategies
11 help individuals deliberately and consciously monitor and organize their own
12 knowledge, processes, and emotional conditions regarding learning (Hacker,
13 1998). Learner through these strategies needs to make decisions about whether
14 s/he has the necessary knowledge for learning, the difficulty of the task, and
15 whether the understanding is achieved (Pintrich, Wolters & Baxter, 2000).
16 Evaluation strategies, it is aimed that individuals make judgments about activities
17 conducted and products created in his/her learning process (Schraw & Moshman,
18 1995). The typical examples of an evaluation process include the learner's re-
19 evaluating the objectives determined at the beginning of the process and
20 reinforcing the cognitive attainments (Schraw, Crippen & Hartley, 2006). In some
21 occasions, reflection activities are used immediately after the evaluation process
22 aiming to put forward the possible results of the learning experience for future
23 cases (Meijer, Veenman, & van Hout-Wolters, 2006).

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

36

37 **Metacognitive Learning Strategies and Learning Tendencies**

38

39 In the use of metacognitive strategies in the learning process; several affective
40 characteristics such as individuals' motivations, attitudes, beliefs and tendencies
41 toward learning and thinking play an important role (Ang, Van-Dyne & Koh,
42 2006; Buckingham-Shum & Deakin-Crick, 2012; Carr & Claxton, 2002).
43 Learning tendency which composes the focus of this research consisted of three
44 interacting elements. These elements are heading for the learning task or being
45 motivated, being sensitive to the learning task and completing the learning task
46 (Perkins, Jay & Tishman, 1993). Generally, supportive learning tendencies in the

1 acquisition of metacognitive strategies include individuals' being open to learning,
2 ready, and willing to take advantage of learning opportunities (Carr & Claxton,
3 2002). In this line tendencies fed by the desires and motivations of individuals to
4 take action, it is revealed in the actions they take in certain situations. For example,
5 an individual with a curious tendency reflects this tendency by continuously
6 asking questions and researching (Buckingham-Shum & Deakin-Crick, 2012).
7 Among the learning and thinking tendencies; it has been determined that features
8 such as mental flexibility, perseverance, openness to change, strategic awareness,
9 willingness to take risks, open-mindedness, intellectual curiosity, and openness to
10 learning come to the fore (Buckingham-Shum & Deakin-Crick, 2012; Carr &
11 Claxton, 2002; Claxton, 2008; Perkins, Jay & Tishman, 1993).

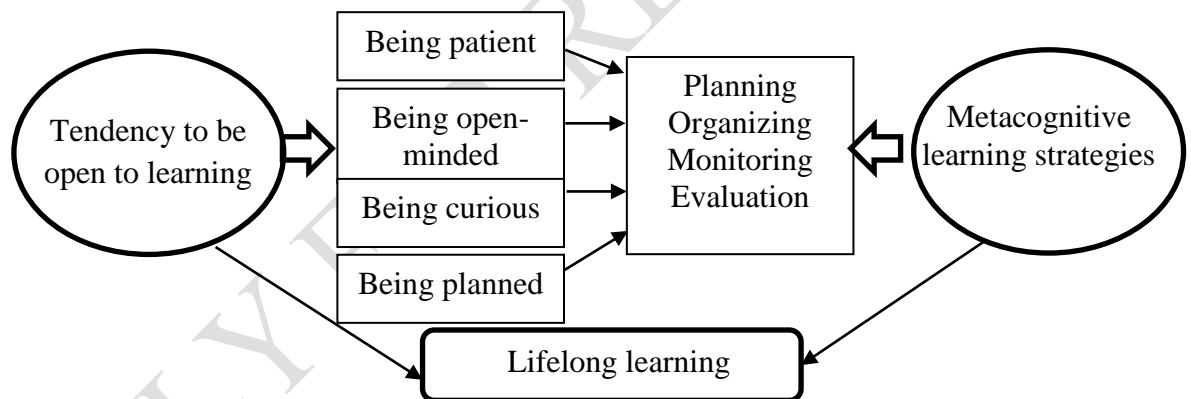
12 Being open to learning, which is among these tendencies and constitutes the
13 independent variable of the research, is defined as learning the quality of thinking
14 and knowledge while making judgments about events, reasons for events, and
15 what needs to be done (Robinson, 2018). Openness to learning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

28 Being patient generally necessitates students to struggle against the negative
29 situations they faced and be insistent (Dweck, 1986; cited in Sideris, 2007).
30 Individuals with the tendency for patience are expected to make an effort in their
31 new learning experiences and situations require struggle (Tunca-Güçlü et al.
32 2022). The tendency to be open-minded is an important affective feature that
33 requires an understanding approach to different ideas and perspectives and directs
34 social relations and individual experiences (Meadows, 2006). In this sense, open-
35 minded individuals should be politically, socially, and culturally unprejudiced,
36 consider different perspectives in necessary situations (Tunca-Güçlü et al. 2022).
37 Curiosity is defined as the desire of individual for continuing to learn about fields
38 of interest in a way developing his/her potential and contributing to society
39 (Meadows, 2006). Individuals with a tendency to be curious are expected to search
40 for interesting topics and problems to support formal and informal learning
41 processes. The tendency for planning which is the last dimension of being open to
42 learning involves preparing for the learning task by organizing conditions such as
43 time management, setting, and materials required for the learning task (Tunca-
44 Güçlü et al. 2022).

45 These dimensions are the characteristics associated with metacognitive
46 learning strategies and lifelong learning tendencies. Since, in the lifelong learning

1 process, individuals should be open to learning to be able to follow the
 2 developments in academic and occupational fields, keep up with these
 3 developments, and be success-oriented (Doğar, 2013; Kozikoğlu & Altunova,
 4 2018). It is seen that individuals open to learning are more willing to participate in
 5 the learning experience, get more benefits from the learning experience (Barrick &
 6 Mount, 1991), and much easier adapt the developments related to social,
 7 economic, and political situations (Watters & Watters, 2007 cited in Türker,
 8 2021). It is stated that the cognitive awareness of individuals who are prone to
 9 learning new things and willing to seek innovation and try, is also high (Ang, Van-
 10 Dyne & Koh, 2006) and they are more successful in activating their metacognitive
 11 processes (Maurer & Shipp, 2021; Öztürk, 2021). Therefore, lifelong learning
 12 individuals should use metacognitive strategies effectively and be open to
 13 learning. It is considered that the tendency for being open to learning could be a
 14 significant variable supporting these strategies. Within this context, the
 15 metacognitive strategies required for the lifelong learning process and the
 16 tendency for being open to learning are the theoretical basis of the research. The
 17 relationships between these concepts are in Figure 1.

18
 19 *Figure 1.* Tendency to be Open to Learning and Metacognitive Strategies in the
 20 Lifelong Learning Process



33 The Need for Research/Rationale

34
 35 Contemporary approaches adopted in the learning-teaching process required
 36 restructuring the meaning attributed to learning concept, learning and teacher
 37 roles, and the characteristics of the learning environment in line with the needs of
 38 the age. In this process, it is aimed to raise individuals who are open to learning
 39 and innovations, who make sense of the presented information by establishing a
 40 relationship with their prior learning, and who use the information they make
 41 sense of in a creative way in new situations (Wiske, Sick, & Wirsig, 2001).
 42 Individuals who show cognitively active participation in learning activities should
 43 acquire the necessary metacognitive skills to take responsibility for their own
 44 learning and thinking processes (OECD, 2019).

45 These features among the 21st-century learning skills directly affect the
 46 competencies teachers should possess. Teachers responsible for guiding the

1 learning process, are expected to consider students' individual differences, plan,
2 apply, and evaluate activities for gaining metacognitive skills (Marzano et al.
3 1988). Teachers' organizing this kind of activities requires their being open to
4 learning and professional development, and undertaking their own learning
5 responsibilities (Ang, Van-Dyne & Koh, 2006; Askill-Williams, Lawson, &
6 Skrzypiec, 2012). Professional development opportunities provided for teachers
7 are seen as very important for the acquisition of these features regarding the
8 organization of metacognitive processes (Bredeson, 2002).

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

17 In related literature, it is observed that the metacognitive awareness of pre-
18 service teachers and the metacognitive strategies they use have been analyzed in
19 terms of different variables (Alkan & Erdem, 2012; Ay & Baloğlu-Uğurlu, 2016;
20 Baykara- Özaydınlık, 2018; Deniz, 2015; Güven & Çevik-Kılıç, 2021; Tümen-
21 Akyıldız & Donmuş-Kaya; 2021; Zhang & Seepho, 2013). Within the other
22 research related to the topic, it is determined that the lifelong learning tendencies
23 of pre-service teachers have been examined (Bilici & Bağcı, 2020; Bulaç & Kurt,
24 2019; Demir & Doğanay, 2019; Yenice & Alpak-Tunç, 2019; Pilli, Sönmezler &
25 Gökten, 2017; Reçepoğlu, 2021). These studies present significant data for the
26 description of these variables. However, limited number of studies, in which the
27 tendency to be open to learning was examined as a sub-dimension of attitude
28 towards learning, were reached (Yavuz- Konokman & Yanpar-Yelken, 2014).
29 Besides, no study was found that analyzed the tendency to be open to learning and
30 metacognitive learning strategies.

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

- 36
- 37 • What is the level of students' metacognitive learning strategies?
- 38 • What is the level of students' tendency to be open to learning?
- 39 • Does the tendency of students to be open to learning significantly predict
- 40 the total scale scores of metacognitive learning strategies?
- 41 • Which of the sub-dimensions of the tendency to be open to learning
- 42 significantly more predict the total scale and subscale scores of
- 43 metacognitive learning strategies?
- 44
- 45
- 46

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.

1 Data Analysis

2
3 Simple linear regression analysis and multiple linear regression analysis were
4 used in the analysis of the data. Within the preparation of the data for simple linear
5 regression analysis, the normal distribution characteristics regarding the scores of
6 dependent and independent variables were checked by determining the kurtosis
7 and skewness coefficients. In this study, it has been determined that the kurtosis
8 and skewness coefficients of the variables varied between -1 and +1, and the
9 values obtained by dividing the skewness and kurtosis coefficients by their own
10 standard errors were between -1.96 and +1.96. Thus, it was found that the scores
11 of predictive and predicted variables showed normal distribution. In addition,
12 correlation analysis was utilized for testing the linear relation between dependent
13 and independent variables, it was determined that there was a moderately
14 significant relationship ($r=.60$) between these variables.

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

30 While the scores of the metacognitive learning strategies scale and the
31 tendency to be open to learning scale were interpreted, the weighted average
32 values were calculated. Mean values regarding the scores obtained from
33 metacognitive learning strategies scale and subscales were interpreted as “between
34 1.00-1.75 never”; “between 1.76-2.50 sometimes”; “between 2.51-3.25 often” and
35 “between 3.26-4.00 always”. On the other hand, mean values for the scores got
36 from tendency to be open to learning scale and subscales were interpreted as
37 “between 1.00-1.80 very low”; “between 1.81-2.60 low”; “between 2.61-3.40
38 moderate”; “between 3.41-4.20 high”; “between 4.21-5.00 very high”. The
39 significance level of .05 was taken as a criterion in interpreting whether the results
40 were significant or not.

41
42

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*
Predictive Values								
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.

1 The Prediction Level of the Metacognitive Learning Strategies Total Score of 2 the Tendency to be Open to Learning

3
4 Simple linear regression analysis results obtained through the third research
5 question are presented in Table 2.

6
7 *Table 2.* Simple Linear Regression Analysis Results on Metacognitive Learning
8 Strategies and the Variables of Tendency to be Open to Learning

Variable	B	Standard Error B	β	t	p
Constant (MLS)	13.151	2.591	-	5.076	.00
TOL	.515	.031	.600	16.704	.00
R= .600 R ² =.36 Adjusted R ² = .36 F(1-497)= 279.022					
MLS (Metacognitive learning strategies)					
TOL (Tendency to be open to learning)					

9
10 It was determined that students' TOL total scores significantly predicted MLS
11 scores as a result of simple linear regression analysis in Table 2 (R=.60. R²=.36.
12 F=279.02. p<.01). It is seen that students' tendencies to be open to learning
13 significantly explain 36% of the change in metacognitive learning strategies.

14 Prediction Level of Metacognitive Learning Strategies Total and Subscale 15 Scores of Sub-Dimensions of Openness to Learning

16
17
18 The results regarding the level that predictive variables constituting tendency
19 to be open to learning predicts MLS total score were presented in Table 3.

20
21 *Table 3.* Multiple Regression Analysis Results Regarding Metacognitive Learning
22 Strategies Scale Total Score and Predictive Variables

Variable	B	Standard Error B	β	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 R ² =.44 Adjusted R ² = .43							
F(4-494)= 96.37 p= .000							

23
24 According to the multiple linear regression analysis results in Table 3; it was
25 determined that the tendencies of being patient, open-minded, curious, and
26 planned were in a significant relationship with MLS total scale scores. The four
27 stated predictive variables significantly explain 44% of the total variance within
28 MLS scores (R=.662. R²= .44 p<.01). According to standardized regression
29 coefficients (β), predictive variables' relative order of importance is being planned,
30 being patient, being curious and being open-minded. When the t test results
31 regarding the significance of the regression coefficients are examined; it is seen

1 that the tendencies to be planned, to be patient and to be curious are significant
 2 predictors of metacognitive learning strategies ($p < .01$), while the tendency to be
 3 open-minded is not a significant predictor of metacognitive learning strategies
 4 ($p = .69 > .05$). The results regarding the level of predictive variables of planning
 5 strategies are presented in Table 4.

6
 7 *Table 4.* Multiple Regression Analysis Results on Planning Strategies Subscale
 8 Score and Predictive Variables

Variable	B	Standard Error B	β	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 ² =	.36	Adjusted R ² =	.35		
F(4-494)=	68.52	p=	.00				

9
 10 According to the multiple linear regression analysis results in Table 4; it has
 11 been determined that the tendencies of being patient, being open-minded, being
 12 curious, and being planned are in a significant relationship with the planning
 13 strategies subscale scores. The stated four predictive variables significantly explain
 14 36% of the total variance within planning strategies scores ($R = .597$, $R^2 = .36$
 15 $p < .01$). With regard to the standardized regression coefficients (β), the relative
 16 importance order of the predictor variables on planning strategies is as; tend to be
 17 planned, patient, curious, and open-minded. When the t test results regarding the
 18 significance of the regression coefficients are examined; it is seen that the
 19 tendencies of being planned and being patient are significant predictors of
 20 planning strategies ($p < .01$), while the tendencies of being curious and being open-
 21 minded are not significant predictors of planning strategies ($p = .71$; $p = .17 > .05$).
 22 The results on prediction level of predictive variables for organizing strategies are
 23 presented in Table 5.

24
 25 *Table 5.* Multiple Regression Analysis Results on Organizing Strategies Subscale
 26 Score and Predictive Variables

Variable	B	Standard Error B	β	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	R ² =	.34	Adjusted R ² =	.34		
F(4-494)=	66.61	p=	.000				

27

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

14

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

Variable	B	Standard Error B	β	t	p	Zero-order Partial	
						r	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 F(4-494)= 33.17	R ² =.21 p=.000	Adjusted R ² = .21					

17

18 With regard to multiple linear regression analysis results in Table 6; it has
 19 been identified that tendencies to be patient, open-minded, curious, and planned
 20 are in a significant relationship with monitoring strategies subscale scores.
 21 Mentioned four predictive variables explain 21% of the total variance in
 22 monitoring strategies ($R=.460$. $R^2= .21$ $p<.01$). According to standardized
 23 regression coefficients (β), the relative importance order of predictive variables on
 24 monitoring strategies is as; tendency to be patient, planned, curious and open-
 25 minded. When the t test results regarding the significance of the regression
 26 coefficients are examined; it is seen that the tendencies of being patient, being
 27 open-minded, being curious, and being planned are significant predictors of the
 28 monitoring strategies ($p<.05$). The results regarding the prediction level of the
 29 predictive variables for the evaluation strategies are presented in Table 7.

30

31

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

Variable	B	Standard Error B	β	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	R2=.14	Adjusted R2= .13				
F(4-494)=	19.64	p=	.000				

3
 4 According to the multiple linear regression analysis results in Table 7; it has
 5 been found out that the tendencies of being patient, being open-minded, being
 6 curious, and being planned are in a significant relationship with the evaluation
 7 strategies subscale scores. Four predictive variables significantly explain about 14
 8 percent of the total variance in evaluation strategies scores ($R=.370$, $R^2=.14$
 9 $p<.01$). Up to the standardized regression coefficients (β), the relative importance
 10 order of predictive variables on evaluation strategies is tendencies to be planned,
 11 patient, curious and open-minded. Examining the t test results regarding the
 12 significance of the regression coefficients it is seen that the tendencies to be
 13 planned, to be patient and to be curious are significant predictors of evaluation
 14 strategies ($p<.001$), while the tendency to be open-minded is not a significant
 15 predictor of evaluation strategies ($p=.44>.05$).

16 17 18 **Discussion**

19
 20 It was aimed to determine tendencies to be open to learning (TOL) and
 21 metacognitive learning strategies (MLS) of students at faculty of education and
 22 analyze predictive relationships between related variables. The obtained
 23 descriptive statistics results within the study show that students frequently use
 24 metacognitive learning strategies, and tendencies to be open to learning are at a
 25 high level. Also in the studies metacognitive learning process and cognitive
 26 awareness strategies were analyzed, it was determined that teachers and pre-
 27 service teachers frequently use cognitive awareness strategies (Ay & Baloğlu-
 28 Uğurlu, 2016; Baykara- Özaydınlık, 2018; Deniz, 2015; Güven & Çevik-Kılıç,
 29 2021; Tümen-Akyıldız & Donmuş-Kaya, 2021; Zhang & Seepho, 2013), that
 30 cognitive awarenesses and learning to learn competencies are at high level (Alkan
 31 & Erdem, 2012; Durmuşçelebi & Kuşçuçuran, 2018). In the literature, no studies
 32 on the tendency to be open to learning were analyzed, have been found. On the
 33 other hand, in the research of Yavuz-Konokman and Yanpar-Yelken (2014),
 34 openness to learning as a sub-dimension of the attitude toward learning was
 35 examined and it was determined that the level of being open to learning of pre-
 36 service teachers was above the average. In other studies in the literature, it is seen
 37 that lifelong learning tendencies, which include dimensions related to being open

1 to learning, are examined. The results of these studies show that pre-service
2 teachers have a high level of lifelong learning tendencies (Bilici & Bağcı, 2020;
3 Bulaç & Kurt, 2019; Yenice & Alpak-Tunç, 2019; Pilli, Sönmezler & Göktaş,
4 2017; Recepoğlu, 2021). It is seen that these results reached through the literature
5 support the study's results.

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

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

31 Examining regression analysis results in terms of predictive variables,
32 tendencies to be patient and planned were found to be significantly predicting the
33 whole metacognitive learning strategies. In the other results obtained, it was
34 detected that the tendency to be open-minded is not a significant predictor on MLS
35 total score and planning, organizing, and evaluating strategies while the tendency
36 to be curious is not a significant predictor on planning strategies. This result puts
37 forward that tendency to be open-minded only effective in activating monitoring
38 strategies. When the related literature has been analyzed, it is seen that tendencies
39 to be open-minded and curious are also included within the scope of critical
40 thinking tendencies (Facione, 1990; Facione, Facione, & Giancarlo, 2000; Merma-
41 Molina, Gavilan-Martin & Urrea-Solano, 2022). The results of the studies
42 concerning the issue show that there is a significant relationship between critical
43 thinking tendencies and metacognitive skills (Sadeghi et al., 2014; Sepahvand, et
44 al., 2017; Soliemanifar et al., 2015). However, that tendencies to be open-minded
45 and curious are not significant predictors on some metacognitive strategies in this
46 study differs from the results in the literature. Open-mindedness is an important

1 affective feature that requires being sensitive to various views and considering
2 different perspectives in encountered situations (Insight Assessment, 2017). It is
3 stated that open-minded individuals focus on the whole, they adhere to the
4 principles of rationality while making decisions about the solution of problems,
5 they change their views when the evidence is sufficient, and they tend to seek
6 certainty about the solution (Ennis, 1985; Bailin, Case, Coombs & Daniels, 1999).
7 Since this situation requires questioning the alternatives before making a decision,
8 it is easier for open-minded individuals to reach the foreseen goals (Merma-
9 Molina et al., 2022). Within the scope of the open-mindedness subscale used in the
10 research, some items necessitate questioning and controlling prejudices to consider
11 different perspectives (Tunca-Güçlü et al., 2022). In this context, affective
12 processes that tend to be open-minded should be monitored, questioned, and
13 controlled. Monitoring strategies in the context of metacognitive strategies are also
14 related to monitoring the process regarding making sense of information,
15 comparing different types of information needed in the learning process, and
16 questioning this information by comparing it with prior knowledge (Namlu, 2004).
17 In this sense, it is observed that monitoring and deciding activities form the basis
18 for the monitoring process (Hertzog & Dunlosky, 2011). Therefore, it is necessary
19 to question and monitor affective processes within the tendency to be open-
20 minded and to monitor and control cognitive processes in monitoring strategies.
21 The tendency to be open-minded is only a significant predictor of monitoring
22 strategies can be associated with the prominence of monitoring and control
23 mechanisms among the main purpose of both variables.

24 Being curious, another predictive variable of the study reflects the tendency to
25 get new information independent from any expectation and learn new things
26 (Kökdemir, 2003). According to Berlyne's (1954; 1960) curiosity theory, there are
27 two types of curiosity as perceptual and epistemic curiosity. It is stated that there
28 are two types of epistemic curiosity related to learning and memory characteristics,
29 as specific and diverse. While specific curiosity includes in-depth research on a
30 specific topic, diverse curiosity shows itself as a general research-analysis
31 behavior (cited in Fulcher, 2004). In this sense, it is seen that attractive situations
32 are handled in a more general and broader framework through diverse curiosity
33 while in specific curiosity the tendency to seek depth in searching for information
34 is at the forefront. The items in the tendency to be curious subscale are associated
35 with turning to topics that they find interesting and worth researching to support
36 formal and informal learning processes (Tunca-Güçlü et al., 2022). In the
37 dimension of planning, one of the metacognitive strategies, individuals are
38 expected to carry out preparatory work on a subject to be learned. In this context,
39 while in-depth examination of research areas developing the potential of
40 individual within the tendency to be curious comes to the fore (Meadows, 2006),
41 planning strategies require the determination of learning objectives that would
42 guide the monitoring the process based on the subject and planning for these
43 objectives (Marzano et al., 1988). In this process, there are activities such as
44 determining the strategies suitable for the learning purpose and predicting the
45 planned time for the learning process (Meijer, Veenman & van Hout-Wolters,
46 2006). It is seen that planning strategies are mostly related with specific curiosity a

1 type of epistemic curiosity, in this context, individuals should handle the
2 information they found worth researching with an in-depth understanding.
3 However, the tendency to be curious was not a significant predictor on planning
4 strategies within the study could be due to pre-service teachers' perceiving
5 curiosity as a general research-analysis behavior. In a study conducted with
6 university students, it was found out that students tended to different issues other
7 than analyzing the information in-depth and their curiosity tendencies do not show
8 continuity (Demirel & Diker-Çoşkun, 2009). Besides, it is indicated that curiosity
9 has dynamics differ in individualist and collectivist societies and sensitive to
10 cultural differences (Acun, Kapkıran & Kabasakal, 2013; Aschieri, Durosini &
11 Smith, 2020). These results reached within the literature; support the view that the
12 tendency to be curious not being a significant predictor on planning strategies
13 could be associated with sample characteristics.

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

33 It was found out that also the power of tendencies to be open to learning
34 predict metacognitive strategies decrease in a systematic structure from planning
35 strategies towards evaluation strategies. This shows that individuals open to
36 learning more tend to use strategies to plan the learning task and structure mental
37 processes. However, it is obvious that this tendency does not show a stable
38 structure; relatively decrease in monitoring and evaluating metacognitive
39 processes. The results of different studies supporting this view; indicate that higher
40 education students use planning and organizing strategies more than monitoring
41 and evaluation strategies (Baykara- Özyaydınlık, 2018; Deniz, 2015; Güven &
42 Çevik-Kılıç, 2021; Namlu, 2004; Langdon et al., 2019; Yang, 2009; Yılmaz &
43 Baydas, 2017; Zhang & Seepho, 2013). In Diker-Coşkun and Demirel's (2012)
44 study, it was determined that higher education students are making an effort to
45 participate in lifelong learning activities, but they are not determined to conclude

1 their optional learning situations. These results obtained are seen to support the
2 findings of the study.

3 4 5 **Conclusions and Implications** 6

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

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

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

36 These obtained results are limited to data gathered from students studying in
37 the faculty of education. In this context, descriptive and predictive studies can be
38 conducted to examine the tendency of teachers to be open to learning and the
39 metacognitive strategies they use. In addition to this, it is considered that
40 qualitative and mixed design research examining the relationship of tendencies to
41 be open-minded and curious with the metacognitive learning process in-depth
42 were necessary.

43
44

References

- 1
2
3 Acun, N., Kapıkıran, Ş., & Kabasakal, Z. (2013). Trait curiosity and exploration
4 inventory-II: Exploratory and confirmatory factor analysis and its reliability. *Turkish*
5 *Psychological Articles*, 16(31), 74-85.
- 6 Adams, D. (2007). Lifelong learning skills and attributes: The perceptions of Australian
7 secondary school teachers. *Issues in Educational Research*, 17(2), 149-160.
- 8 Alkan, F., & Erdem, E. (2012). A study on the metacognitive awareness of prospective
9 teachers. *Journal of Kâzım Karabekir Education Faculty*, 25, 55-76.
- 10 Amin, A. M., Corebima, A. D., Zubaidah, S., & Mahanal, S. (2020). The correlation
11 between metacognitive skills and critical thinking skills at the implementation of four
12 different learning strategies in animal physiology lectures. *European Journal of*
13 *Educational Research*, 9(1), 143-163. <https://doi.org/10.12973/eu-jer.9.1.143>
- 14 Ang, S., Van-Dyne, L., & Koh, C. (2006). Personality correlates of the four-factor model
15 of cultural intelligence. *Group & organization management*, 31(1), 100-123.
- 16 Aschieri, F., Durosini, I., & Smith, J. D. (2020). Self-curiosity: Definition and
17 measurement. *Self and Identity*, 19(1), 105-115. [https://doi.org/10.1080/15298868.20](https://doi.org/10.1080/15298868.2018.1543728)
18 [18.1543728](https://doi.org/10.1080/15298868.2018.1543728)
- 19 Askill-Williams, H., Lawson, M. J., & Skrzypiec, G. (2012). Scaffolding cognitive and
20 metacognitive strategy instruction in regular class lessons. *Instructional Science*,
21 40(2), 413-443. <https://doi.org/10.1007/s11251-011-9182-5>
- 22 Ay, E., & Baloğlu-Uğurlu, N. (2016). Determining the metacognitive strategies of social
23 studies teacher candidates in terms of different variables. *International Periodical for*
24 *the Languages, Literature and History of Turkish or Turkic*, 11(3), 327-344. [http://dx.](http://dx.doi.org/10.7827/TurkishStudies.9095)
25 [doi.org/10.7827/TurkishStudies.9095](http://dx.doi.org/10.7827/TurkishStudies.9095)
- 26 Bailin, S., Case, R., Coombs, J. R., & Daniels, L.B. (1999). Conceptualizing critical
27 thinking. *Journal of Curriculum Studies*, 31(3), 285-302. [https://doi.org/10.1080/002](https://doi.org/10.1080/002202799183133)
28 [202799183133](https://doi.org/10.1080/002202799183133)
- 29 Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job
30 performance: A meta-analysis. *Personnel psychology*, 44(1), 1-26.
- 31 Baykara-Özaydınlık, K. (2018). A comparative analysis of preservice teachers'
32 metacognitive learning strategies and teacher self-efficacy perceptions. *Hacettepe*
33 *University Journal of Education*, 33(1), 125-143. [https://doi.org/10.16986/HUJE.20](https://doi.org/10.16986/HUJE.2017028409)
34 [17028409](https://doi.org/10.16986/HUJE.2017028409)
- 35 Bilici, O., & Bağcı, H. (2020). Investigation of the relationship between teacher
36 candidates' lifelong learning tendencies and their readiness for e-learning. *Sakarya*
37 *University Journal of Education Faculty*, 20(2), 205-219.
- 38 Blakey, E., & Spence, S. (1990). *Developing metacognition*. New York: ERIC
39 Clearinghouse on Information and Technology.
- 40 Bredeson, P. V. (2002). The architecture of professional development: Materials,
41 messages and meaning. *International Journal of Educational Research*, 37(8), 661-
42 675. [https://doi.org/10.1016/S0883-0355\(03\)00064-8](https://doi.org/10.1016/S0883-0355(03)00064-8)
- 43 Brezin, M. J. (1980). Cognitive monitoring: From learning theory to instructional
44 applications. *ECTJ*, 28(4), 227-242.
- 45 Buckingham-Shum, S., & Deakin-Crick, R. (2012, April). *Learning dispositions and*
46 *transferable competencies: pedagogy, modelling and learning analytics*. Paper
47 presented at 2nd International Conference on Learning Analytics & Knowledge,
48 Vancouver, British Columbia, Canada.
- 49 Bulaç, E., & Kurt, M. (2019). Investigation of tendencies of prospective teachers towards
50 lifelong learning. *Amasya Education Journal*, 8(1), 125-161.

- 1 Carr, M., & Claxton, G. (2002). Tracking the development of learning dispositions.
2 *Assessment in Education: Principles, Policy & Practice*, 9(1), 9-37. [https://doi.org/](https://doi.org/10.1080/09695940220119148)
3 10.1080/09695940220119148
- 4 Claxton, G. (2012). Cultivating positive learning dispositions. In H. Daniels, H. Lauder &
5 J. Porter (Eds), *Educational theories, cultures and learning* (pp. 177-187). London:
6 Routledge.
- 7 Cornford, I. R. (2002). Learning-to-learn strategies as a basis for effective lifelong
8 learning. *International Journal of Lifelong Education*, 21(4), 357-368. [https://doi.](https://doi.org/10.1080/02601370210141020)
9 [org/10.1080/02601370210141020](https://doi.org/10.1080/02601370210141020)
- 10 Crow, S. R. (2006). What motivates a lifelong learner? *School Libraries Worldwide*,
11 12(1), 22-34.
- 12 Demir, Ö., & Doganay, A. (2019). An investigation of metacognition, self-regulation and
13 social intelligence scales' level of predicting pre-service teachers' lifelong learning
14 trends. *International Journal of Progressive Education*, 15(5), 131-148. [https://doi.](https://doi.org/10.29329/ijpe.2019.212.10)
15 [org/10.29329/ijpe.2019.212.10](https://doi.org/10.29329/ijpe.2019.212.10)
- 16 Demir, Ö., & Kaya, H. İ. (2015). An investigation of relations between pre-service
17 teachers' metacognition skill levels and their critical thinking situations. *Pegem*
18 *Journal of Education and Instruction*, 5(1), 35-68. [https://doi.org/10.14527/pegegog.](https://doi.org/10.14527/pegegog.2015.003)
19 2015.003
- 20 Demirel, M., & Diker- Çoşkun, Y. (2009). Investigation of curiosity levels of university
21 students in terms of some variables. *Mehmet Akif Ersoy University Journal of*
22 *Education Faculty*, 9(18), 111-134.
- 23 Deniz, J. (2015). Prospective music teachers' usage levels of metacognitive learning
24 strategies. *The Journal of Academic Social Science*, 3(14), 1-14.
- 25 Diker-Coşkun, Y., & Demirel, M. (2012). Lifelong learning tendencies of university
26 students. *Hacettepe University Journal of Education*, 42, 108-120.
- 27 Doğar, N. (2013). *Study of relationships between the personality, organizational*
28 *commitment and job satisfaction in two commercial banks in İstanbul* [Unpublished
29 doctoral dissertation]. Çukurova University, Turkey.
- 30 Durmuşçelebi, M., & Kuşçuçuran, B. N. (2018). Students' cognitive awareness and
31 investigation of critical thinking levels. *International Journal of Innovative Research*
32 *in Education*, 5(4), 129-144.
- 33 Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. *Educational*
34 *Leadership*, 43(2), 44-48.
- 35 European Commission. (2002). *European report on quality indicators of lifelong learning.*
36 *Fifteen quality indicators*. Brussels: European Commission, Directorate-General for
37 Education and Culture.
- 38 Facione, P. A., Facione, N. C., & Giancarlo, C. A. F. (2000). *The California critical*
39 *thinking disposition inventory: CCTDI test manual*. California Academy Press.
- 40 Facione, P.A. (1990). *A statement of expert consensus for purpose of educational*
41 *assessment and instructions. Research findings and recommendations*. American
42 Philosophical Association. Newark, DE.
- 43 Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-
44 developmental inquiry. *American Psychologist*, 34(10), 906-911.
- 45 Fulcher, K. H. (2004). *Towards measuring lifelong learning: The curiosity index*
46 [Unpublished doctoral dissertation]. James Madison University, USA.
- 47 Güven, E., & Çevik-Kılıç, D. B. (2021). Investigation of metacognitive learning strategies
48 of pre-service music teachers in terms of certain variables. *Mehmet Akif Ersoy*
49 *University Journal of Education Faculty*, 60, 480-509. [https://doi.org/10.21764/ma](https://doi.org/10.21764/maeuefd.934739)
50 [euefd.934739](https://doi.org/10.21764/maeuefd.934739)

- 1 Hertzog, C., & Dunlosky, J. (2011). Metacognition in later adulthood: Spared monitoring
2 can benefit older adults' self-regulation. *Current Directions in Psychological*
3 *Science*, 20(3), 167-173. <https://doi.org/10.1177%2F0963721411409026>
- 4 Insight Assessment. (2017). *California critical thinking dispositions inventory: A measure*
5 *of the critical thinking mindset user, user manual and resource guide*. San Jose, CA:
6 California Academic Press.
- 7 Knapper, C. K., & Cropley, A. J. (2000) *Lifelong learning in higher education* (3rd ed.).
8 London: Kogan Page.
- 9 Kozikoğlu, İ., & Altunova, N. (2018). The predictive power of prospective teachers' self-
10 efficacy perceptions of 21st century skills for their lifelong learning tendencies.
11 *Journal of Higher Education and Science*, 8(3), 522-531. [https://doi.org/10.5961/jh](https://doi.org/10.5961/jhes.2018.293)
12 [es.2018.293](https://doi.org/10.5961/jhes.2018.293)
- 13 Kökdemir, D. (2003). *Belirsizlik durumlarında karar verme ve problem çözme*
14 [Unpublished doctoral dissertation]. Ankara University, Turkey.
- 15 Langdon, J., Botnaru, D. T., Wittenberg, M., Riggs, A. J., Mutchler, J., Syno, M., &
16 Caciula, M. C. (2019). Examining the effects of different teaching strategies on
17 metacognition and academic performance. *Advances in Physiology Education*, 43(3),
18 414-422. <https://doi.org/10.1152/advan.00013.2018>
- 19 Marzano, R. J., Brandt, R. S., Hughes, C.S., Jones, B. F., Presseisen, B.Z., Rankin, S. C. &
20 Suhor, C. (1988). *Dimensions of thinking: A framework for curriculum and*
21 *instruction*. Alexandria, VA: The Association for Supervision and Curriculum
22 Development.
- 23 Maurer, T., & Shipp, C. (2021). Challenges of shaping student study strategies for
24 success. *Teaching and Learning Inquiry*, 9(1), 241-257. [https://doi.org/10.20343/](https://doi.org/10.20343/teachlearninqu.9.1.16)
25 [teachlearninqu.9.1.16](https://doi.org/10.20343/teachlearninqu.9.1.16)
- 26 Meadows, E. (2006). Preparing teachers to be curious, open minded, and actively
27 reflective: Dewey's ideas reconsidered. *Action in Teacher Education*, 28(2), 4-14.
28 <https://doi.org/10.1080/01626620.2006.10463406>
- 29 Meijer, J., Veenman, M. V., & van Hout-Wolters, B. H. (2006). Metacognitive activities
30 in text-studying and problem-solving: Development of a taxonomy. *Educational*
31 *Research and Evaluation*, 12(3), 209-237. [https://doi.org/10.1080/138036105004](https://doi.org/10.1080/13803610500479991)
32 [79991](https://doi.org/10.1080/13803610500479991)
- 33 Merma-Molina, G., Gavilan-Martin, D., & Urrea-Solano, M. (2022). Actively open-
34 minded thinking, personality and critical thinking in Spanish adolescents: A
35 correlational and predictive study. *International Journal of Instruction*, 15(2), 579-
36 600. <https://doi.org/10.29333/iji.2022.15232a>
- 37 Namlu, A. G. (2004). Metacognitive learning strategies scale: A study of reliability and
38 validity. *Anadolu University Journal of Social Sciences*, 4(2), 123-136.
- 39 OECD. (2000). *Motivating students for lifelong learning*. Centre for Educational Research
40 and Innovation. <https://doi.org/10.1787/9789264181830-en>
- 41 OECD. (2019). *OECD future of education and skills 2030: Project background*. Retrieved
42 from https://www.oecd.org/education/2030project/contact/OECD_Learning_Compas_2030_Concept_Note_Series.pdf
43
- 44 Öztürk, N. (2021). The relation of metacognition, personality, and foreign language
45 performance. *International Journal of Psychology and Educational Studies*, 8(3),
46 103-115. <https://dx.doi.org/10.52380/ijpes.2021.8.3.329>
- 47 Perkins, D. N., Jay, E., & Tishman, S. (1993). Beyond abilities: A dispositional theory of
48 thinking. *Merrill-Palmer Quarterly*, 39(1), 1-21.
- 49 Pilli, O., Sönmezler, A., & Gökten, N. (2017). Pre-service teachers' tendencies and
50 perceptions towards lifelong learning. *European Journal of Social Science Education*
51 *and Research*, 4(4), 318-325.

- 1 Pintrich, P. R., Wolters, C., & Baxter, G. (2000). Assessing metacognition and
2 self-regulated learning. In G. Schraw & J. Impara (Eds.), *Issues in the measurement of*
3 *metacognition* (pp. 43-97). Lincoln, NE: Buros Institute of Mental Measurement.
- 4 Receptoğlu, S. (2021). Investigation of the relationship between social studies teacher
5 candidates' lifelong learning tendencies and self-directed learning skills. *Gazi*
6 *University Gazi Education Faculty Journal*, 41(1), 551-569.
- 7 Robinson, V. (2018). *Open-to-learning conversations: Background paper introduction to*
8 *open-to-learning conversations*. New Zealand: University of Auckland.
- 9 Sadeghi, B., Hassani, M. T., & Rahmatkhan, M. (2014). The relationship between EFL
10 learners. metacognitive strategies, and their critical thinking. *Journal of Language*
11 *Teaching and Research*, 5(5), 1167-1175. <https://doi.org/10.4304/jltr.5.5.1167-1175>
- 12 Scales, P., Briddon, K., & Senior, L. (2015). *Yaşam boyu öğrenme ve öğretim* [Lifelong
13 learning and teaching] (Ü. Köymen, Trans.). Ankara: Palme Publishing. (Original
14 work published 2013)
- 15 Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*,
16 26(1), 113-125.
- 17 Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology*
18 *Review*, 7(4), 351-371.
- 19 Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science
20 education: Metacognition as part of a broader perspective on learning. *Research in*
21 *Science Education*, 36(1), 111-139. <https://doi.org/10.1007/s11165-005-3917-8>
- 22 Sepahvand, E., Shehni Yailagh, M., Porbiryany, S. A., & Behrozi, N. (2017). Testing a
23 model of causal relationships of family communication patterns, metacognition, and
24 personality traits with critical thinking disposition, mediated by epistemic beliefs of
25 female high school students in Ahvaz. *International Journal of Psychology*, 12(1),
26 50-80.
- 27 Sideridis, G. D. (2007). Persistence of performance-approach individuals in achievement
28 situations: An application of the Rasch model. *Educational Psychology*, 27(6), 753-
29 770. <https://doi.org/10.1080/01443410701309290>
- 30 Soliemanifar, O., Behrozi, N., & Moghaddam, S. (2015). Role of personality traits,
31 learning styles and metacognition in predicting critical thinking of undergraduate
32 students. *Education Strategies in Medical Sciences*, 8(1), 59-67.
- 33 Tan, C. L., & Morris, J. S. (2005). Undergraduate college students, laptop computers, and
34 lifelong learning. *The Journal of General Education*, 54(4), 316-338.
- 35 Tunca-Güçlü, N., Yeşilpınar-Uyar, M., & Alkın-Şahin, S. (2022). Tendency to be open to
36 learning scale: Validity and reliability studies. *Shanlax International Journal of*
37 *Education*, 11(1), 112-20. <https://doi.org/10.34293/education.v11i1.4765>
- 38 Tümen-Akyıldız, S., & Donmuş-Kaya, V. (2021). Examining prospective teachers'
39 metacognitive learning strategies and self-regulated online learning levels during
40 covid-19 pandemic. *International Journal of Contemporary Educational Research*,
41 8(4), 144-157. <https://doi.org/10.33200/ijcer.912897>
- 42 Türker, K. M. (2021). Kadın çalışanların öğrenmeye açıklık tutumu [Openness to learning
43 attitude of female employees]. In İ. Erdoğan Tarakçı (Ed.). *Disiplinlerarası*
44 *yaklaşımlarla kadın çalışmaları* [Women's studies with interdisciplinary
45 approaches] (pp. 173- 197). İstanbul: Efe Akademi Publishing.
- 46 Wiske, M. S., Sick, M., & Wirsig, S. (2001). New technologies to support teaching for
47 understanding. *International Journal of Educational Research*, 35(5), 483-501.
48 [https://doi.org/10.1016/S0883-0355\(02\)00005-8](https://doi.org/10.1016/S0883-0355(02)00005-8)
- 49 Yang, C. (2009). A Study of metacognitive strategies employed by English listeners in an
50 EFL setting. *International Education Studies*, 2(4), 134-1139.

- 1 Yavuz-Konokman, G., & Yanpar-Yelken, T. (2014). Investigation of preschool teacher
2 candidates' attitudes towards learning and their entrepreneurship levels. *International*
3 *Online Journal of Educational Sciences*, 6(3), 648-665. [http://dx.doi.org/10.15345/](http://dx.doi.org/10.15345/ijoes.2014.03.013)
4 [ijoes.2014.03.013](http://dx.doi.org/10.15345/ijoes.2014.03.013)
- 5 Yenice, N., & Alpak-Tunç, G. (2019). An investigation of pre-service teachers' lifelong
6 learning tendencies and their individual innovativeness levels. *Kastamonu Education*
7 *Journal*, 27(2), 753-765. <https://doi.org/10.24106/kefdergi.2716>
- 8 Yilmaz, R. M., & Baydas, O. (2017). An examination of undergraduates' metacognitive
9 strategies in pre-class asynchronous activity in a flipped classroom. *Educational*
10 *Technology Research and Development*, 65(6), 1547-1567. [https://doi.org/10.1007/](https://doi.org/10.1007/s11423-017-9534-1)
11 [s11423-017-9534-1](https://doi.org/10.1007/s11423-017-9534-1)
- 12 Zhang, L., & Seepho, S. (2013). Metacognitive strategy use and academic reading
13 achievement: Insights from a Chinese context. *Electronic Journal of Foreign*
14 *Language Teaching*, 10(1), 54-69.

ONLY FOR REVIEW