Pre-Service Teachers' Self-Efficacy Perceptions and Metacognitive Skills in Predicting the Measurement and Evaluation Course Achievement[*]

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Abstract

The purpose of the current study is to determine the relationships between pre-service teachers' measurement and evaluation course achievement, grade point average, gender, general self-efficacy perception of measurement and evaluation and metacognitive skills. The study group is comprised of 180 students having taken the measurement and evaluation course in the 2019-2020 academic year. As the data collection tool, the "Measurement and Evaluation Self-Efficacy Perception Scale for Pre-service Teachers" developed by Nartgün (2008) and the "Metacognitive Skills Scale" developed by Altındağ and Senemoğlu (2013) were used. The measurement and evaluation course achievement were calculated by taking 40% of the midterm and 60% of the final scores of students. While students were asked to create an original story by using the 24 basic concepts for the midterm exam, 6 open-ended items were given as homework for the final exam. The collected data were analyzed by using the hierarchical multiple regression analysis. The measurement and evaluation course achievement were taken as dependent variable; grade point average, gender, measurement and evaluation self-efficacy perception and the metacognitive skill scores were taken as independent variables. As a result, it was seen that grade point average in the first stage and the general self-efficacy perception in the second stage significantly predicted the measurement and evaluation course achievement.

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INTRODUCTION

Teachers are important members of the educational process who are assigned the responsibility of training individuals who are considered to be the future of a society. Such an important responsibility requires teachers to be more competent and qualified (Ministry of National Education [MNE], 1999). In this connection, teacher competencies have been determined as a result of workshops and pilot applications and opinions expressed by experts, academicians and teachers and "General Competencies for the Teaching Profession" have been defined in accordance with the developments in the field of education and the innovations in the education system. The General Competencies for the Teaching Profession present the characteristics that a teacher should have in a concrete way and be a reference for the policies to be developed in this field. Moreover, they are expected to contribute to teachers' objectively recognizing their strengths and weaknesses that need improvement. These characteristics are discussed in three competency areas: professional knowledge, professional skills, attitudes and values. Four sub-competencies have been determined in the field of professional skills competency area and one of these sub-competencies is measurement and evaluation (MNE, 2017). Based on Standards for teacher Competence in Educational Assessment of Students (AFT, NCME, & NEA, 1990) a skilled teacher can a) choose and develop assessment methods appropriate for instructional decisions, b) administer, score, and interpret the assessment results, c) use assessment results when making decisions about individual students, teaching, curriculum, and school improvement, d) develop valid student grading procedures, e) communicate assessment results to students, parents and other education stakeholders, f) recognize unethical, illegal, and otherwise inappropriate assessment methods and uses of assessment information. The measurement and evaluation competency is important part of teaching skill and should be gained by teacher education programs (Mayo, 1967). Obviously, teachers carry out quality control of educational activities in line with the knowledge and skills they have gained in the measurement and evaluation course.

In Turkey, measurement and evaluation skills are tried to be imparted to pre-service teachers within the context of measurement and evaluation course in undergraduate education. In line with the course content updated by the higher education institution [HEI] in year 2018, in the measurement and evaluation course, pre-service teachers are expected to gain competencies in the "place and importance of measurement and evaluation in education", "basic concepts of measurement and evaluation", "psychometric properties of measurement tools", "development and application of achievement tests", "interpretation of test results and giving feedback", "analysis of test and item scores" and "evaluation and grading" (HEI, 2018).Measurement and evaluation course achievement can be affected by many mental, environmental and affective factors. Current studies (Alkharusi, 2009; Kart & Gülleroğlu, 2013; Kottke, 2000; Kurşun & Çobanoğlu-Aktan, 2016; Mueller, 1974) show that the factors that related to measurement and evaluation course achievement are mathematical proficiency, statistical knowledge, statistical competency, attitude toward educational measurement, self-confidence in educational measurement, math self-concept, general academic achievement, verbal aptitude, gender, father education status, type of high school graduated. Apart from these factors, self-efficiency (Bandura, 1994; Maddux, 2002; Öztürk & Kurtuluş, 2017; Pintrich & De Groot 1990; Schunk & Pajares, 2002; Zimmerman, 2000) and metacognition (Kroll & Miller, 1993; Yang & Lee, 2013; Wilson, 1999) are reported in many researches as related factors with general course achievement.

Self-efficacy can be defined as a person's perception of his/her ability to organize and execute the actions necessary to achieve specified performance (Bandura, 2006). Self-efficacy is related to one's belief in accomplishing a task (Bandura, 1997) and is important for one's effort and perseverance. Self-efficacy can change depending on the actions and conditions that affect the behavior of the person and the environments in which he/she interacts. Children with the same level of cognitive skills may differ in their mental performance depending on their self-efficacy perceptions (Bandura, 1993; Flavell,

1979; Gravill, Compeau, & Marcolin; 2002; Zimmerman, 2000). It is stated that the higher the perception of self-efficacy the individual has, the better his/her cognitive competencies are (Bandura, 1993; Costabile et al., 2013). Although self-efficacy is an important determinant of success, it is not the only factor. When the necessary skills and knowledge are missing, self-efficacy may be limited in terms of fulfilling a performance (Schunk & Pajares, 2002).

Another affective variable that is thought to have an impact on course achievement and provides control over learning processes is metacognitive skills (Desoete, Roeyers, & Buysse, 2001). As Ormrod (2004) stated that metacognition is the activity of monitoring and controlling one's ability to know and what we know about our cognitive processes and how we use these processes for the purpose of to learn and remember. Metacognition consists of two subcomponents; metacognitive knowledge and metacognitive regulation. While how a person knows and makes sense of his/her learning paths and memory is related to metacognitive knowledge, how a person organizes and adjusts his/her learning paths and memory is related to metacognitive regulation skills. Metacognitive regulation helps monitor cognitive activities and control their results (Flavell, 1987). Metacognition enables students to realize what they have learned, in which situations what they have learned is useful and the processes involved in the use of what they have learned (Pressley, Snyder, & Cariglia-Bull, 1989). Having metacognitive knowledge and metacognitive regulation skills can make students academically superior (Young & Fry, 2008). Developing students' metacognitive skills can contribute to their learning performance (Coutinho, 2008; Garner & Alexander, 1989; Veenman, Van Hout-Wolters, & Afflerbach, 2006) and increasing their academic performance (Çakıroğlu, 2007; Özsoy, 2008). In the existing research, the lack of metacognitive skills has been associated with the failure of students in some courses (Kroll & Miller, 1993; Wilson, 1999; Yang & Lee, 2013). Kruger and Dunning (1999) pointed out that metacognition is a strong predictor of academic achievement and pointed to its importance in learning. The perception of self-efficacy and metacognition are important in terms of learning and performance (Gourgey, 1998). It is argued that individuals with high self-efficacy have better performance and metacognition regarding a task than those with low self-efficacy (Coutinho & Neuman, 2008).

to gain measurement and evaluation competency, pre-service teacher should fulfill the measurement and evaluation course successfully (çardak, 2018; kurşun & çobanoğlu-aktan, 2016). however, many students who enrolled in the measurement and evaluation course state that they have learning difficulties (kottke, 2000) and feel themselves incompetent because of learning gaps (karadavut, nacar, & karadavut, 2020). therefore, it is worth examining the factors which related to measurement and evaluation course achievement for effective teaching and learning in educational measurement. as above mentioned, self-efficiency and metacognition skills have important and essential roles in teaching and learning (karpicke, butler & roediger iii, 2009; siriparp, 2015), but there is not any research which focusing the relation between self-efficiency, metacognitive skills and course achievement in educational measurement. therefore, it is important to examine correlation of self-efficiency and metacognitive skills with measurement and evaluation course achievement. in this connection, the purpose of the current study is stated to be to determine the effect of grade point average, gender, general self-efficacy perception of measurement and evaluation and metacognitive skills of pre-service teachers on measurement and evaluation course achievement. thus, the problem statement of the study is worded as follows:

Do pre-service teachers' grade point average, gender, general self-efficacy perception of measurement and evaluation and metacognitive skills significantly predict their measurement and evaluation course achievement?

METHOD

RESEARCH DESIGN

The study aimed to reveal whether measurement and evaluation course achievement was predicted by measurement and evaluation self-efficacy, metacognitive skills, gender and grade point average. Therefore, measurement and evaluation course achievement was considered as dependent variable; self-efficacy perception towards measurement and evaluation, metacognitive skills, gender and grade point average were considered as independent variables. In this respect, the research was evaluated within the scope of correlational research. Correlational research gives information about the existence of the relationship between the variables. Correlation studies also have a predictive feature. Regression analyses in which the dependent variable is estimated with the help of one or more independent variables are also evaluated within the scope of correlational research (Fraenkel, Wallen, & Hyun, 2012).

STUDY GROUP

The study group of the current research was comprised of 192 students, who took the measurement and evaluation course in the 2019-2020 academic year. In this study, the study group consisted of students who attended the courses conducted by the researchers in the relevant academic year. The research was carried out with convenient sampling, one of the non-probability or nonrandom sampling methods. It is often not possible for researchers to select random or systematic sampling. In this case, researchers may prefer to use convenient sampling (Fraenkel *et al.*, 2012.) Convenient sampling is the selection of individuals who are currently eligible for the study. This sampling may consist of easily accessible or volunteer individuals who meet certain conditions at a certain time (Farrokhi & Mahmoudi-Hamidabad, 2012).

As a result of the preliminary analysis of the data, 180 of these 192 students were decided to be included in the study. In Table 1, the distribution of the students according to gender and the department attended is given.

Table 1. *Distribution of the Students According to Gender*

Variables		f	%
Gender	Female	18	65.6
	Male	62	34.4
Department	Science	23	12.8
	English	28	15.6
	Pre-school	23	12.8
	Psychological Counselling and Guidance	33	18.3
	Social Sciences	42	23.3
	Turkish	31	17.2
Total		180	100.0

Table 1 indicated that 65.6% (n=118) of the students were females and 34.4% (n=62) were males. Moreover, 12.8% (n=23) of the students were from the department of science teaching, 15.6% (n=28) were from the department of English language teaching, 12.8% (n=23) were from the department of pre-school teaching, 18.3% (n=33) were from the department of psychological counselling and guidance, 23.3% (n=42) were from the department of social studies teaching and 17.2% (n=31) were from the department of Turkish language teaching.

DATA COLLECTION

In the current study, the "Measurement and Evaluation General Self-Efficacy Perception Scale for Pre-service Teachers" developed by Nartgün (2008) and the "Metacognitive Skills Scale" developed

by Altındağ and Senemoğlu (2013) were administered online. The measurement and evaluation course achievement were determined by taking 40% of midterm and 60% of final exams.

MEASUREMENT AND EVALUATION SELF-EFFICACY PERCEPTION SCALE FOR PRE-SERVICE TEACHERS

This measurement tool has three factors called "basic concepts", "measurement techniques" and "statistical analysis and reporting". The scale scored as a five-point Likert scale consists of a total of 24 items. It was stated that as a result of the exploratory factor analysis, the scale was three-dimensional and its reliability in terms of internal consistency (Cronbach alpha) was .84 for the first factor; .79 for the second factor; it was .77 for the third factor (Nartgün, 2008).

METACOGNITIVE SKILLS SCALE

This scale is uni-dimensional and consists of 30 items designed in the form of five-point Likert scale. The Cronbach's alpha coefficient calculated for the reliability of the scale in terms of internal consistency is .94 (Altındağ & Senemoğlu, 2013).

MEASUREMENT AND EVALUATION COURSE ACHIEVEMENT

In the current study, in order to determine the achievement in the measurement and evaluation course, students took midterm and final exams. In midterm exam, the students were asked to create an original story by using 24 basic concepts discussed in the measurement and evaluation course. The concepts addressed in the stories are shown in Table 2. The concepts in Table 2 are taught to students by giving examples within the scope of the course of measurement and evaluation in education. In this performance task, the students were expected to further develop the examples given in the lesson and find new examples. The criteria that were taken into account were that the given example should be suitable for the relevant basic concept and that an example should be given for each concept.

Table 2. *Basic Concepts Used to Create Stories*

Basic Concepts in the Measurement and Evaluation Course		An Example for Performance Task
Variable type	● Quantitative ● Qualitative ● Continuous ● Categorical ● Dependent ● Independent	
Measurement type	● Direct ● Indirect ● Derived	
Unit type	● Natural ● Artificial	I entered the classroom. That day, there were <u>40 students</u> in the classroom (**Direct measurement**). I asked the students in the
Scale type	● Nominal ● Ordinal ● Interval ● Ratio	classroom whether they had done their homework. I classified the students into <u>two groups</u> as those who had done their homework
Criterion type	● Relative ● Absolute	and those who hadn't (**Nominal variable**) …………
Assessment type	● Norm-referenced ● Criterion-referenced ● Diagnostic ● Formative ● Summative	
Error type	● Constant ● Systematic	

The stories were scored on the basis of the following criteria: if the basic concept was exemplified correctly, then "1" point was given but "0" was given if wrong or no example was provided for the concept in the story and then the obtained scores were converted into a 100-point system. To determine interrater reliability of performance task scores, 10 stories were randomly selected and rated by two raters independently. The Spearman's correlation coefficient (Spearman, 1910) was calculated for determining interrater agreement and found as .74 (p<.05). We can say that there was a strong and statistically significant relationship between ratings of raters (Reynolds, Livingston, & Wilson, 2010).

The final exam consisted of 6 open-ended items which covers "psychometric properties of measurement tools", "aspects of measurement tools in education", "test constructing process" and "item and test score analyses". Final exam was given students as a homework. Content validity of final exam was verified by two experts who specialized at educational measurement and evaluation area. For interrater reliability of final scores, 10 homework were chosen randomly and scored independently by two raters. The Spearman's correlation coefficient was calculated for determining interrater agreement and found as .79 (p< .05). We can say that there was a strong and statistically significant relationship between two ratings of raters (Reynolds et al., 2010). Then, for this study general course achievement score was calculated by taking 40% of midterm and 60% of final score (Atalmış, 2019; Öztürk-Gübeş, 2021).

DATA ANALYSIS

In this study, first of all, the suitability of the data set for analysis was examined. To this end, firstly, the z values of the scale total scores were calculated and univariate outliers were examined, and the answers of 12 students whose z value was outside the range of +/-3.00 (Raykov & Marcoulides, 2008), were removed from the data set and the analyses were continued with the data of 180 students. In the second stage of data analysis, to validate scores from "Measurement and Evaluation Self-Efficacy Perception Scale for Pre-service Teachers" and "Metacognitive Skill Scale" confirmatory factor analysis (CFA) was conducted.

In the third stage of data analysis, hierarchical multiple regression analysis was performed. In hierarchical multiple regression analysis, the predictor variables can be analyzed in the order that the researcher previously determined. The researcher can determine this order based on his/her experience and previous research. New predictors can all be added to the model simultaneously, incrementally or hierarchically (Field, 2005). In the current study, the variables of general academic achievement (Kurşun & Çobanoğlu-Aktan, 2016) and gender (Kart & Güleroğlu, 2013), which were determined to be statistically significant predictors of measurement and evaluation achievement in previous studies, were first included in the model, and then the scores taken from the Measurement and Evaluation General Self-Efficacy Perception Scale for Pre-service Teachers and the score taken from the "Metacognitive Skills Scale" were included. In the analyses, the "enter" model was used. Gender was included in the analysis by being coded as "dummy female" variable.

In this study, SPSS 22.0 program package was used for descriptive statistics of dependent and independent variables, correlations between variables and regression analysis. The CFA was run in LISREL 8.80 program. In the evaluation of model data fit for CFA, the most recommended indexes in the literature and the most tested in simulation studies were used. For this purpose; normed chi-square(χ^2/df), the root-mean-square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI) and standardized root mean square residual (SRMR) has been reported. CFI and TLI values in the range of .90–.95 is indicative of acceptable model fit (Bentler, 1990). Browne and Cudeck (1993) suggested that RMSEA values of .05 or less indicate a close approximation and that values of up to .08 suggest a reasonable fit of the model in the population. The SRMR can take a range of values between .0 and 1.0 and the smaller the SRMR shows the better the model fit. Hu and Bentler (1999) stated that SRMR values should be .08 or less for good agreement between observed data and

target model. In addition, it is stated that there is an acceptable fit when the normed chi-square value is less than 3.00 (Kline, 2005).

FINDINGS

The descriptive statistics for the data were given in Table 3.

Table 3. *Descriptive Statistics for the Variables*

Variables	Min.	Max.	Mean	sd	Skewness (SE)	Kurtosis (SE)
Course Achievement	50.00	100.00	83.45	8.57	-.62 (.18)	.86 (.36)
Grade Point Average	1.66	3.99	3.11	0.45	-.69 (.18)	.39(.36)
Metacognition	83.00	146.00	113.62	12.09	.13 (.18)	.19 (.36)
GESP	49.00	118.00	82.12	12.64	.195 (.18)	.009 (.36)

GESP: General self-efficacy perception of measurement and evaluation, Min.: Minimum, Max.: Maximum, sd: Standart deviation, SE: Standard Error

As shown in Table 3, it was clear that the skewness and kurtosis coefficients of the variables were in the range of +/- 1.00, so the assumption of univariate normality was satisfied. It was determined that there is no multicollinearity problem in the data set as the tolerance values were found to be .55 minimum, not lower than .20 and VIF values were found to be .86 maximum, lower than 10.00 (Çokluk, Şekercioğlu & Büyüköztürk, 2010).

Table 4 presents the CFA results for "Measurement and Evaluation Self-Efficacy Perception Scale for Pre-service Teachers" and "Metacognitive Skill Scale".

Table 4: *CFA Results for Scales*

	Chi-square	df	Chi-square/df	RMSEA	CFI	TLI	SRMR
Measurement and evaluation self-efficacy perception scale	575.95	245	2.35	.087	.94	.93	.087
Metacognitive skills scale	835.31	405	2.06	.077	.93	.93	.073

In the current study, the second-order CFA was conducted to provide evidence for the presentation of sub-scales of Measurement and Evaluation Self-Efficacy Scale for Pre-Service Teacher under a general factor. As Table 4 presents, the fit indices obtained from second-order CFA showed that model – data fit has been achieved [$\chi^2(245)$ = 575.95, RMSEA= .087, CFI = .94, TLI= .93, SRMR= .087] and the sub-scales of scale can be presented under a general factor. Therefore, in this study instead of using sub-scale scores, total score of Measurement and Evaluation Self-Efficacy Perception Scale for Preservice Teachers was used. The Cronbach's alpha and Omega reliability coefficients (McDonald, 1999) of scale were found as .92. The CFA results of Metacognitive Skills Scale were also presented in Table 2. The fit indices showed that model-data fit has been achieved [$\chi^2(405)$ = 835.31, RMSEA=.077, CFI= .93, TLI= .93, SRMR= .073] and the unidimensional construct of the Metacognitive Skill Scale was confirmed. The Omega and Cronbach's alpha reliability coefficient of the scale was found to be .90. The widely used rule thumb in social sciences of > .70 for Cronbach's alpha and when we consider omega is lower-bound of alpha (Catalán, 2019), we can say that the omega results for this study is sufficient enough.

To determine relation between pre-service teachers' measurement and evaluation course achievement, grade point average, general self-efficacy perception of measurement and evaluation and metacognitive skills, Pearson product -moment correlations were calculated. Table 5 presents the correlation values between the variables.

Table 5. *Correlation Values Between Variables*

Variables	GESP	Metacognitive skills	Grade poin taverage	Course achievement
GESP	1			
Metacognitive skills	.48**	1		
Grade point average	.13	.19*	1	
Course achievement	.23**	.15*	.34**	1

GESP: General Self-Efficacy Perception; *p<.05; ** p<.01

According to Table 5, the dependent variable measurement and evaluation course achievement correlated significantly and positively with GESP (r= .23, p<.01), metacognitive skills (r= .15, p<.05) and grade point average (r = .34, p<.01). Also, the relation between GESP and metacognitive skills was statistically significant and positive (r= .48, p<.01), the relation between GESP and grade point average was positive but not significant (r=.13, p>.05).

To determine whether or not pre-service teachers' grade point average, gender, general self-efficacy perception of measurement and evaluation and metacognitive skills significantly predict their measurement and evaluation course achievement, hierarchical multiple regression analysis was conducted. In the first block, the general academic achievement and gender variables were included to the model, in the second block GESP and metacognitive skills score were included to the model. The obtained findings are presented in Table 6.

Table 6. *Findings Related to the Hierarchical Linear Regression Analysis*

Variables	B	SE(B)	β	t
Block 1				
Grade Point Average	6.98	1.42	.37	4.93**
Gender	-1.31	1.35	-.07	-.97
$R^2 = .123, R^2_{adj.} = .11, F = 12.391, p < .01$				
Block 2				
Grade Point Average	6.33	1.42	.34	4.43**
Gender	-.75	1.34	-.04	-.55
GESP	.125	.05	.19	2.30*
Metacognitive skills	.00	.05	.00	-.00
$R^2 = .16, R^2_{adj.} = .14, F = 8.06, p < .01$				

*p<.05; **p< .01 ; GESP: General Self-Efficacy Perception

Table 6 indicates that in the first block, the grade point average and gender variables predicted significantly the measurement and evaluation course achievement [$F_{(2,176)}$= 12.391, p<0.01, R^2=.123, R^2_{adj}= 0.11]. The predictors in Model 1 explained 12% of the variability in the measurement and evaluation achievement score. While the grade point average in the Model1 was statistically significant predictor (β=.37, t=4.93 p<0.05), the gender variable (β=-.07, t=-.97 p>.05) was not a statistically significant predictor.

In the second block, general self-efficacy perception and metacognitive skills were included in the model. All variables included in the second model were found as significantly predicted the measurement and evaluation course achievement [$F_{(4,174)}$ = 8.06, p<.01, R^2=.16, R^2_{adj}= .14] and explained 16% of the total variance. The contribution general self-efficacy perception and metacognitive skills which has been added in the second block of the model was found as 4%. In the second model, the general self-efficacy perception and grade point average were found as statistically significant predictors (β=.19, t=2.30 p<.05; β=.33, t=4.43 p<.01). When the other predictors were kept constant, one standard deviation increase in the student's general self-efficacy perception of the basic

concepts causes an increase of .19 standard deviation and grade point average causes an increase of .33 standard deviation in the achievement score.

DISCUSSION, CONCLUSION AND IMPLICATIONS

In the current study, the extent to which the pre-service teachers' measurement and evaluation course achievement is predicted by grade point average, gender, metacognitive skills and the general self-efficacy perception of the measurement and evaluation was examined. The results of hierarchical multiple regression analysis showed that in the first stage, grade point average and in the second stage grade point average and general self-efficacy perception of measurement and evaluation significantly predicted the measurement and evaluation course achievement. As a result of the current study, both of first and second model, grade point average significantly predicted the measurement and evaluation course achievement. Accordingly, it was concluded that students with high general academic achievement also have high achievement in the measurement and evaluation course and this finding concurs with the literature. Kurşun and Çobanoğlu-Aktan (2016), in their study examining the factors affecting the achievement in measurement and evaluation, stated that the most important variable predicting the achievement in the measurement and evaluation course is general academic achievement.

Another result obtained in the current study is that the gender variable was not a significant predictor of the measurement and evaluation course achievement. This result contradicts with Akharusi (2009) and Kart and Gülleroğlu (2013) findings. They found gender differences in academic performance in educational measurement course achievement. When the literature is reviewed, there are studies that reveal that the gender variable is a determining factor of achievement (Halpern, 2000; Woolfolk, 2014). While there are studies reporting that gender is an important variable in mathematics achievement (Demir et al., 2006)), there are also studies stating that it has no effect on students' mathematics achievement (Chen, 2003; Yücel & Koç, 2011). When studies on this subject are examined, inconsistent results are found regarding the relationship between gender and achievement. Some studies show that when student, family and school characteristics are held constant, female students in Turkey lag behind boys in mathematics and science (Demir & Kılıç, 2010; Dinçer & Oral 2013; Özdemir, 2016; Dinçer & Uysal, 2010; Ferreira & Gignoux 2010). This indicates an undesirable achievement difference in between male and female students (Batyra, 2017). For this reason, it can be considered as a desired situation that the achievement in measurement and evaluation is not predicted by gender. This result might indicate that females and males are at similar levels in terms of course achievement, and that the teaching given does not make a difference between females and males.

The results also showed that there was a significant and positive but weak relationship between metacognitive skills and measurement and evaluation course achievement and metacognitive skills were not a significant predictor of measurement and evaluation course achievement. This finding is inconsistent with the literature which emphasized metacognition was important for academic achievement (Kruger & Dunning, 1999). Metacognition is defined as the act of monitoring and controlling one's own cognition. Students with high metacognitive skills are expected to take responsibility for their learning, be more successful academically and overcome the problems they encounter (Yenice, Hiğde & Özden, 2017). For this study, one possibility is that the student may not have reflected their higher-order thinking processes as critical thinking and deep comprehension in stories for midterm and homework for final exams. As Coutinho and Neuman (2008) stated "Metacognition could be necessary for learning, comprehension, problem solving and critical thinking are not very important for academic performance, which could require rote memorization more than metacognition." (p.146).

It was finally found in the current study that the general self-efficacy perception of measurement and evaluation was a statistically significant predictor of the measurement and evaluation course achievement. According to Gourgey (1998) the perception of self-efficacy is important in terms of learning and performance. Moreover, self-efficacy is an important predictor of achievement in Social Cognitive Theory (Pajares, 1996; Zimmerman, Bandura & Martinez-Pons, 1992). Therefore, the results of this study support the findings of studies that emphasize the positive relationship between achievement and self-efficacy (Alcı, Erden, & Baykal, 2008; Coutinho & Neuman, 2008; Feldman & Kubota, 2015; Zuffianò et al., 2013).

The current study focused on the variables that predict pre-service teachers' measurement and evaluation course achievement. The results showed that students who had more general self-efficacy perception of measurement and evaluation course were more successful in the course. Therefore, it is suggested that to develop learning environments which increase students' self-efficacy toward measurement and evaluation course.

On the other hand, this study is limited to university students attending an education faculty. Similar studies can be conducted on undergraduate students taking the measurement and evaluation course at different universities or on different departments not included in the current study such as arts teaching, music teaching, physical education and theology education and thus more comprehensive understanding of the prediction of achievement can be attained. The structural equation model can be used by taking different variables into the model to explain the measurement and evaluation achievement. With the types of analysis that adopt the classification approach, the variables that best predict the measurement and evaluation course achievement can be determined in new studies. Calculation of the achievement score in the current study is limited to the given performance task and homework. The performance task and homework can be improved in such a way as to address higher-order skills and then the extent to which it explains metacognitive skills and the measurement and evaluation course achievement can be investigated.

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