

Investigation of Prospective Teachers' Self-Regulated Learning Skills in terms of Different Variables

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ABSTRACT

This study aimed to describe the self-regulated learning skills of prospective teachers studying at a public university in Istanbul and reveal their differences in relation to the components of these skills. The screening model was used in the research. The sample consisted of students studying at a public university in Istanbul in the 2018-2019 academic year and applied to randomly selected 926 students. This study was carried out with 926 first-, second-, third- and fourth-grade students. The Self-Regulatory Learning Skills Scale (SRLSS) and a personal information form were used as the data collection tools. The findings of the research revealed that the prospective teachers had high scores in the subscales of SRLSS and the overall scale. It was concluded that the prospective science teachers had higher scores in planning and goal-setting than the students attending all other programs except for mathematics teaching. Furthermore, the scores of female prospective teachers in all subscales were higher than those of the male participants. Considering the type of high school, the participants that had completed basic high school scored higher in strategy use and evaluation compared to those that had finished other types of high school. When the prospective teachers' self-regulated learning skills were analyzed according to their parents' education level, no significant difference was found.

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Keywords:

Self-regulated learning, prospective teachers, teacher education.

INTRODUCTION

It is important that prospective teachers who will play an active role in education develop self-regulated learning skills consisting of sub-dimensions, such as motivation, planning, strategy use and evaluation, and learning dependency. Thus, ensuring that these skills are developed in students enrolled in teacher education programs will both increase the success of the new generation and raise individuals with these skills. One of the aims of education is to raise individuals that can manage their own learning processes and actively participate in these processes, are aware of their own abilities, and can use them in a positive manner. In reaching this goal, self-regulated learning, in which an individual guides her/himself and transfers her/his mental abilities and skills to the learning process, is of great importance (Gömleksiz & Demiralp, 2012).

Since the concept of self-regulation has a versatile structure covering behavioral, mental, social-emotional and motivational processes, it has been addressed and defined by many theoretical perspectives. Self-regulation skills, first introduced by Bandura, focus on the importance of an individual reflecting on her/his abilities and capacities regarding the behaviors that s/he will display (Çiltaş & Bektaş, 2009; Çiltaş, 2011). In social-cognitive theory, Bandura defined self-regulation as having an internal system in which to control one's feelings, thoughts and actions, and further explained this internal system as having functions, such as planning alternative strategies, organizing own behavior, having the ability to symbolize, and learning from others (Karabacak, 2014). Zimmerman (1989) described self-regulation as the degree of active participation of students in their own learning processes in terms of metacognition, motivation, and behavior.

Self-regulation, one of the most important factors affecting lifelong learning and academic success of an individual, is a deep internal mechanism encompassing the careful, deliberate and thoughtful behaviors of students (Bodrova & Leong, 2005). Self-regulation is an effective and constructive process in which students set their own learning goals, try to regulate their cognition,

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motivation and behavior, and are guided and limited by their goals and the contextual characteristics of their environment (Pintrich, 2000).

The research in the fields of education and psychology shows that self-regulation develops especially at a young age (Raffaelli, Crockett & Shen, 2005). According to studies emphasizing the importance of the family environment, which provides the first support for the child in her/his developmental process, the mother, in particular, should promote her child's desire to be independent, determined, and different, supporting her/his identity development. If the mother or the family environment does not allow the child to have an independent life of her/his own and move away from the family, it paves the way for her/him not taking any responsibility in life, including learning processes (Cloud & Townsend 1996; Bronson, 2000; Raffaelli et al., 2005; Israel, 2007). Although the ability to self-regulate is acquired at an early age, many studies (Azevedo & Cromley, 2004; Butler, 1998; Lizarraga et al., 2003; Masui & De Corte, 1999; Perels, Gürtler & Schmitz, 2005; Perry & VandeKamp, 2000; Schmitz & Wiese, 2005) have shown that self-regulation skills can also be improved at an older age through education.

Individuals' need to meet and organize their own learning requirements any time they desire has led to the emergence of the concept of self-regulated learning (Üredi & Üredi, 2007). Self-regulated learning emphasizes a person's autonomy and control in acquiring knowledge, acquiring experience and self-monitoring, and directing and regulating actions taken (Paris & Paris, 2001). With the contribution of studies revealing that learners' achievements during the self-regulatory learning process play a significant role in increasing their motivation and success levels, creating learning environments which support students' self-regulated learning skills gains even more importance (Zimmerman & Martinez Pons, 1986; Pintrich & De Groot, 1990; Boekaerts & Corno, 2005). Accordingly, students with a high level of self-regulated learning skills have the opportunity to associate their classroom environments with the scientific knowledge they have acquired, comprehend the changing structure of science, express their ideas in the classroom, present their opinions concerning the design of their own learning environments, and participate in discussions with their peers on any scientific subject, and they also feel freer in displaying such behaviors.

Teachers have a number of responsibilities in creating the learning environments necessary for the development of students' self-regulated learning strategies. To this end, teachers can guide learners to prepare and configure an effective learning environment, organize teaching and activities to facilitate cognitive and metacognitive processes, use educational targets and feedback to encourage students to self-monitor, inform learners about the self-evaluation process, and offer them opportunities to engage in self-evaluation (Lay & Young, 2001). It was deemed necessary to conduct this study to investigate the level of self-regulated learning skills of prospective teachers.

The general aim of the research was to describe the self-regulated learning skills of prospective teachers studying at a public university in Istanbul and evaluate the components of these skills, namely motivation and taking action to learn, planning and goal-setting, strategy use and evaluation, and dependency in learning. In line with this purpose, the following research questions were determined:

- What is the level of prospective teachers' self-regulated learning skills?
- Do the prospective teachers' self-regulated learning skills differ according to their majors?
- Do the prospective teachers' self-regulated learning skills differ according to their grade levels?
- Do the prospective teachers' self-regulated learning skills differ according to their gender?
- Do the prospective teachers' self-regulated learning skills differ according to the type of high school they completed?
- Is there a relationship between the prospective teachers' self-regulated learning skills and age?

- Do the prospective teachers' self-regulated learning skills differ according to their parents' education level?
- Do the prospective teachers' self-regulated learning skills differ according to their socioeconomic level?

METHOD

Research Model

This was a quantitative study based on the screening model design. According to Karasar (2004), the screening model aims to "describe a situation that existed in the past or still exists as it is". In this research, the views of the prospective teachers concerning their level of self-regulated learning skills were described as they were presented.

Study Group

The study group consisted of students (prospective teachers) studying at public university in Istanbul in the 2018-2019 academic year and selected using the stratified sampling method. The sample comprised first-, second-, third- and fourth-grade students attending teacher education programs at the departments of computer education and instructional technology (CEIT), classroom teaching, preschool teaching, mathematics teaching, science teaching, guidance and psychological counseling (GPC), Turkish language teaching, social studies teaching, special education, English language teaching, French language teaching, and German language teaching. Participation was voluntary. Table 1 presents the distribution of the students in the study group by gender and grade levels.

Table 1. Distribution of prospective teachers by gender and grade level

Grade level	Male		Female		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
First grade	74	58.0	190	27.7	264	28.5
Second grade	59	24.6	152	22.2	211	22.8
Third grade	68	28.3	203	29.6	271	29.3
Fourth grade	39	16.2	141	20.6	180	19.4
Total	240	100.0	686	100.0	926	100.0

The sample consisted of 926 prospective teachers, 240 (25.9%) male and 686 (74.1%) female, of whom 264 (28.5%) were first-graders, 211 (22.8%) were second-graders, 271 (29.3%) were third-graders, and 180 (19.4%) were fourth-graders.

Data Collection Tools

Personal information form: This form was prepared by the researchers to record information on the prospective teachers' major, grade level, gender, type of high school completed, age, socioeconomic level, and parents' education level.

Self-Regulated Learning Skills Scale (SRLSS): Developed by Turan (2009) to determine the self-regulated learning skills of university students, this instrument consists of 41 items based on a five-point Likert scale (strongly agree, agree, neither agree or disagree, disagree, and strongly disagree). The lowest score that can be obtained from the scale is 41, and the highest is 205. The scale comprises four subscales as motivation and taking action to learn (seven items), planning and goal-setting (eight items), strategy use and evaluation (19 items), and dependency in learning (seven items). These subscales include the theoretically defined stages for self-regulated learning (Turan, 2009). For the current study, the Kaiser-Meyer-Olkin coefficient of the scale was found to be 0.956, and the Bartlett test was significant at $p < 0.01$. As a result of the repeated factor analyses, the 41 items in the scale clustered under four factors with an eigenvalue greater than 1.5, with the first factor explaining 18.36% of the total variance, the second factor 16.94%, the third factor 11.95%, and the fourth factor 7.87%, which makes the total of 47.10%. The Cronbach alpha coefficients were reported to be 0.88,

0.91, 0.83 and 0.76 for factors 1 to 4, respectively and 0.91 for the overall scale (Turan, 2009). In the current research, the Cronbach alpha coefficient of the scale was calculated as .93.

Data Analysis

The statistical analyses of the measurement tools were performed using SPSS v. 16.0. Before starting the analysis, the Kolmogorov-Smirnov test was conducted to check the normality assumption for the distribution of data, and the skewness-kurtosis values of the scores were also examined. According to the results of the Kolmogorov-Smirnov test, the data had normal distribution since the significance value was less than .05, and the skewness-kurtosis coefficient was between +2.0 and -2.0 as described by George and Mallery (2010); thus, parametric tests were used. Non-parametric tests were utilized in cases where the number of variables was less than 30. As parametric tests, the independent samples t-test, one-way analysis of variance (ANOVA), and Pearson's product-moment correlation coefficient technique were employed while the Kruskal Wallis-H and Mann Whitney-U analyses were undertaken as non-parametric methods.

RESULTS

This section presents the findings and their interpretation concerning whether the prospective teachers' views on their self-regulated learning skills differed according to their major, grade level, gender, type of high school completed, age, socioeconomic level, and parents' education level.

Table 2. Mean scores of the participants in the Self-Regulated Learning Skills Scale

	N	\bar{x}	SD
Motivation and taking action to learn	926	4.02	.62
Planning and goal-setting	926	3.88	.68
Strategy use and evaluation	926	3.84	.55
Dependency in learning	926	3.43	.67
Overall scale	926	3.81	.48

SD: standard deviation

Table 2 presents the mean scores obtained from the four subscales of SRLSS. In order to determine the self-regulated learning skill level of the prospective teachers based on their subscale scores, the interval width was calculated using the formula, "array width/number of applied groups ($4/5 = 0.80$)" (Tekin, 1993). The arithmetic mean ranges of the scale were determined interpreted as 'very low' for a score of 1.00-1.79, 'low' for 1.80-2.59, 'moderate' for 2.60-3.39, 'high' for 3.40-4.19, and 'very high' for 4.20-5.00. When the mean scores of the participants in the four subscales of SRLSS were examined according to these ranges, it was determined that they had a high level of self-regulated learning skills.

Table 3. Results of the one-way analysis of variance of the prospective teachers' scores in the Self-Regulated Learning Skills scale according to their majors

	Group	N	\bar{x}	Mean		Sum squares	Total squares	F	p	
1 st Subscale	CEIT	54	27.68	5.51	Between group	291.829	26.530	1.399	.167	
	CT	93	27.80	3.74	Within group	17328.361	18.959			
	PT	79	28.67	4.06						
	SE	111	29.29	3.33	Total	17620.190				
	MT	61	28.49	3.17						
	GPC	98	28.31	4.01						
	TLT	77	27.92	4.73						
	SST	73	27.56	4.36						
	SPE	61	27.40	6.37						
	ELT	113	28.48	4.20						
	ALT	74	28.10	4.55						
	FLT	32	27.37	4.87						
	Total	926	28.20	4.36						
	2 nd Subscale	CEIT	54	29.53	6.47	Between group	961.695	87.427	3.002	.001**
CT		93	31.04	4.99	Within group	26619.882	29.125			
PT		79	30.84	5.09						
SE		111	33.28	4.38	Total	27581.577				
MT		61	32.08	4.69						
GPC		98	31.59	5.29						
TLT		77	30.51	6.07						
SST		73	30.75	4.78						
SPE		61	30.36	6.22						
ELT		113	30.07	5.89						
ALT		74	30.93	5.75						
FLT		32	30.28	5.19						
Total		926	31.06	5.46						
3 rd Subscale		CEIT	54	71.62	12.38	Between group	3879.703	352.700	3.277	.000**
	CT	93	72.58	9.49	Within group	98363.028	107.618			
	PT	79	74.02	9.41						
	SE	111	77.96	8.72	group					
	MT	61	74.22	9.23	Total	102242.731				
	GPC	98	72.89	9.43						
	TLT	77	73.00	12.20						
	SST	73	72.46	10.19						
	SPE	61	71.04	11.98						
	ELT	113	72.57	10.37						
	ALT	74	71.17	11.71						
	FLT	32	69.68	10.48						
	Total	926	73.14	10.51						

	Group	N	\bar{x}	Mean	Sum squares	Total squares	F	p				
4 th Subscale	CEIT	54	21.87	5.20	Between group	624.301	56.755	2.559	.003*			
	CT	93	23.82	4.40						Within group	20271.791	22.179
	PT	79	24.11	4.52								
	SE	111	24.81	5.14								
	MT	61	23.16	4.28								
	GPC	98	24.71	4.31								
	TLT	77	23.54	5.34								
	SST	73	24.98	4.26								
	SPE	61	24.18	4.27								
	ELT	113	24.65	3.96								
	ALT	74	23.01	5.37								
	FLT	32	23.78	6.18								
	Total	926	24.03	4.75								
	Whole Scale	CEIT	54	150.72	23.75	Between group	13733.768	1248.524	3.183	.000**		
CT		93	155.25	18.47	Within group						358497.916	392.230
PT		79	157.65	19.26								
SE		111	165.36	16.93								
MT		61	157.96	17.04								
GPC		98	157.52	18.70								
TLT		77	154.98	23.63								
SST		73	155.76	19.01								
SPE		61	153.00	24.67								
ELT		113	155.78	19.38								
ALT		74	153.22	17.57								
FLT		32	151.12	22.45								
Total		926	156.45	20.06								

CEIT: computer education and instructional technology, CT: classroom teaching, PT: preschool teaching, MT: mathematics teaching, ST: science teaching, GPC: guidance and psychological counseling, TLT: Turkish language teaching, SSE: social studies teaching, SPE: special education, ELT: English language teaching, FLT: French language teaching, GLT: German language teaching; * $p < .05$; ** $p < .01$

The SRLSS scores of the prospective teachers statistically significantly differed for the second subscale (planning and goal-setting) [$F_{(11-914)} = 3.002, p < .01$], third subscale (strategy use and evaluation) [$F_{(11-914)} = 3.277, p < .01$], fourth subscale (dependency in learning) [$F_{(11-914)} = 2.559, p < .05$], and the overall scale [$F_{(11-914)} = 3.183, p < .01$]. According to the results of the post-hoc Tukey HSD test, the prospective science

teachers had higher scores in the second subscale compared to all other majors, except for mathematics teaching. The prospective science teachers' scores in the third subscale were also higher than all participants attending all the other departments, except for Turkish language teaching, preschool teaching, and mathematics teaching. The prospective teachers studying at the departments of science, social sciences and English language education scored higher in the fourth subscale than those attending CEIT programs. Finally, when the whole scale was considered, it was determined that the self-regulated learning skill levels of the prospective science teachers was higher than the participants doing majors in science teaching, mathematics teaching, and GPC. For the first subscale (motivation and taking action to learn), the prospective teachers' scores [$F_{(11-914)} = 1.399; p > .05$] did not statistically significantly differ according to their majors (Table 3).

Table 4. Results of the one-way analysis of variance of the prospective teachers' scores in the Self-Regulated Learning Skills scale according to their grade levels

	Group	N	\bar{x}	Mean	Sum squares	Total squares	F	p	
1 st Subscale	1 st grade	264	28.26	4.64	Between group	60.592	20.197	1.061	.365
	2 nd grade	211	27.76	4.82	Within group	17559.598	19.045		
	3 rd grade	271	28.28	3.78	group				
	4 th grade	180	28.51	4.17	Total	17620.190			
	Total	926	28.20	4.36					
2 nd Subscale	1 st grade	264	31.22	5.68	Between group	162.601	54.200	1.823	.141
	2 nd grade	211	30.30	5.39	Within group	27418.976	29.739		
	3 rd grade	271	31.31	5.10	group				
	4 th grade	180	31.37	5.67	Total	27581.577			
	Total	926	31.06	5.46					
3 rd Subscale	1 st grade	264	73.76	11.13	Between group	1160.087	386.696	3.527	.015*
	2 nd grade	211	71.18	9.87	Within group	101082.644	109.634		
	3 rd grade	271	73.32	10.10	group				
	4 th grade	180	74.28	10.68	Total	102242.731			
	Total	926	73.14	10.51					
4 th Subscale	1 st grade	264	24.15	4.37	Between group	289.839	96.613	4.323	.005*
	2 nd grade	211	23.18	4.98	Within group	20606.252	22.350		
	3 rd grade	271	24.00	4.58	group				
	4 th grade	180	24.88	5.11	Total	20896.092			
	Total	926	24.03	4.75					
Whole Scale	1 st grade	264	157.42	21.33	Between group	4947.354	1649.118	4.140	.006*
	2 nd grade	211	152.43	20.14	Within group	367284.331	398.356		
	3 rd grade	271	156.91	17.93	group				
	4 th grade	180	159.06	20.54	Total	372231.685			
	Total	926	156.45	20.06					

* $p < .05$

The differences in the participants' SRLSS scores according to their grade levels were statistically significant for the subscales of strategy use and evaluation [$F_{(3-922)} = 3.527, p < .05$], dependency in learning [$F_{(3-922)} = 4.323, p < .05$], and the overall scale [$F_{(3-922)} = 4.140, p < .05$]. The Tukey HSD test conducted to determine the grade groups that significantly differed in terms of the self-regulated learning skills revealed that the first-graders and fourth-graders had significantly higher scores in strategy use and evaluation compared to the second-graders; the fourth-graders had significantly higher scores than the second-graders in dependency in learning; and the total scores of the first- and fourth-graders were significantly higher than those of the second-graders. However, there were no significant differences between the participants from different grade levels in terms of their scores in motivation and taking action to learn [$F_{(3-922)} = 1.061; p > .05$] and planning and goal-setting [$F_{(3-922)} = 1.823; p > .05$] (Table 4).

Table 5. Results of the independent samples *t*-test of the prospective teachers' SRLSS scores according to the gender variable

	Gender	N	\bar{x}	SD	t	p
Motivation and taking action to learn	Male	240	27.67	5.46	-2.200	.028*
	Female	686	28.39	3.89		
Planning and goal-setting	Male	240	29.67	6.42	-4.646	.000**
	Female	686	31.55	4.99		
Strategy use and evaluation	Male	240	71.84	12.15	-2.234	.026*
	Female	686	73.60	9.84		
Dependency in learning	Male	240	23.21	5.05	-3.099	.002*
	Female	686	24.31	4.61		
Whole Scale	Male	240	152.41	23.27	-3.652	.000**
	Female	686	157.87	18.61		

SRLSS: Self-Regulated Learning Skills Scale; SD: standard deviation; * $p < .05$, ** $p < .01$

There was a statistically significant difference between the male and female prospective teachers in relation to their SRLSS subscale scores and total scores in favor of the latter ($t = -2.200, p < .05$ for motivation and taking action to learn; $t = -4.646, p < .01$ for planning and goal-setting; $t = -2.234, p < .05$ for strategy use and evaluation; $t = -3.099, p < .05$) for dependency in learning; and $t = -3.652, p < .01$ for the overall scale) (Table 5).

Table 6. Results of the Kruskal-Wallis test of the prospective teachers' scores in the Self-Regulated Learning Skills Scale according to the type of high school completed

	Groups	N	Mean rank	Chi-square	SD	p
Motivation and taking action to learn	Science high school	10	471.75	4.617	5	.464
	Anatolian high school	412	452.56			
	Teacher high school	150	450.55			
	Vocational high school	115	503.03			
	Basic high school	120	486.75			
	Other	119	455.37			
	Total	926				
Planning and goal-setting	Science high school	10	588.30	8.744	5	.120
	Anatolian high school	412	456.83			
	Teacher high school	150	432.96			
	Vocational high school	115	474.25			
	Basic high school	120	512.29			
	Other	119	455.01			
	Total	926				
Strategy use and evaluation	Science high school	10	461.60	12.637	5	.027*
	Anatolian high school	412	447.63			
	Teacher high school	150	429.63			
	Vocational high school	115	491.65			
	Basic high school	120	530.22			
	Other	119	466.80			
	Total	926				
Dependency in learning	Science high school	10	473.60	2.328	5	.802
	Anatolian high school	412	466.01			
	Teacher high school	150	457.76			
	Vocational high school	115	434.19			
	Basic high school	120	467.74			
	Other	119	485.23			
	Total	926				
Whole scale	Science high school	10	494.60	6.109	5	.296
	Anatolian high school	412	454.47			
	Teacher high school	150	433.47			
	Vocational high school	115	482.97			
	Basic high school	120	505.46			
	Other	119	468.88			
	Total	926				

* $p < .05$

As a result of the Kruskal-Wallis test conducted to determine whether the prospective teachers' SRLSS scores differed according to the type of high school they had completed, significant differences were

found for the subscale of strategy use and evaluation ($\chi^2 = 12.637, p < .05$). Then, complementary comparison techniques were used to identify the groups with significant differences. For this purpose, the Mann-Whitney U analysis, a non-parametric technique preferred in binary comparisons, was applied, and the scores of the prospective teachers that had finished basic high school were found to be significantly higher than those of the participants that had completed Anatolian or teacher high school. However, no significant difference was detected in relation to the motivation and taking action to learn ($\chi^2 = 4.617, p > .05$), planning and goal-setting ($\chi^2 = 8.744, p > .05$) and dependency in learning ($\chi^2 = 2.328, p > .05$) subscales or the overall scale ($\chi^2 = 6.109, p > .05$) (Table 6).

Table 7. Results of the Pearson product-moment correlation analysis between the prospective teachers' scores in SRLSS and age

Variables	N	r	p
Age	926	.065	.046*
Motivation and taking action to learn	926	.053	.107
Age	926	.012	.715
Planning and goal-setting	926	.099	.003*
Age	926	.058	.076
Strategy use and evaluation			
Age			
Dependency in learning			
Age			
Overall scale			

SRLSS: Self-Regulated Learning Skills Scale; * $p < .05$

A positive relationship was observed between the prospective teachers' age and their subscale scores in motivation and taking action to learn ($r = .065; p < .05$) and dependency in learning ($r = .099; p < .05$) while age was not significantly correlated with the participants' scores in planning and goal-setting ($r = .053, p > .05$), strategy use and evaluation ($r = .012, p > .05$), and the overall scale ($r = .058; p > .05$) (Table 7).

The Kruskal Wallis-H analysis was conducted to determine whether the prospective teachers' SRLSS scores significantly differed according to their parents' education level, and no significant difference was found for any of the subscales or the overall scale. The results obtained in relation to the education levels of the father and mother were as follows: $\chi^2 = 9.446$ and 1.746 , respectively for motivation and taking action to learn; $\chi^2 = 4.374$ and 3.848 , respectively for planning and goal-setting; $\chi^2 = 6.706$ and 6.205 , respectively for strategy use and evaluation; $\chi^2 = 5.569$ and 4.191 , respectively for dependency in learning; and $\chi^2 = 5.972$ and 4.830 , respectively for the overall scale ($p > .05$ for all).

Considering the one-way ANOVA results of the prospective teachers' SRLSS scores according to their socioeconomic level, no statistically significant difference was obtained from any of the subscales or the overall scale. The $F_{(4-921)}$ value was calculated as .343, .900, .500, .433 and .624 for the subscales of motivation and taking action to learn, planning and goal-setting, strategy use and evaluation, and dependency in learning, and as .624 for the overall scale ($p > .05$ for all).

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This study investigated whether the prospective teachers studying at Education Faculty of a state university in Istanbul in the 2018-2019 academic year had significantly different views on their self-regulated learning skills according to their majors, grade levels, gender, type of high school completed, age, socioeconomic level, and parents' education level. The results of analyses revealed that the prospective teachers obtained high scores in the SRLSS subscales and the overall scale; thus, it

can be stated that the self-regulated learning skills of the prospective teachers were positive and at a high level.

When the participants' SRLSS scores were examined according to their majors, it was determined that the prospective science teachers had higher scores in planning and goal-setting than the teacher's candidates studying at all other departments except for mathematics teaching. This was an expected finding considering that the science and mathematics fields cover practices and processes that require planning. Students doing their majors in these areas have the opportunity to actively participate in their own learning processes during classes, experiments, and other practices. Thus, they can develop many cognitive connections and concepts that constitute self-regulated learning. Therefore, it can be assumed that the prospective science and mathematics teachers had probably started to develop their planning and goal-setting skills in their high school years and further improved these skills through the courses they attended at university.

The prospective science teachers' strategy uses and evaluation scores were higher compared to the participants enrolled in the other teacher education programs with the exception of Turkish language teaching, preschool teaching, and mathematics teaching. The dependency in learning scores of the participants doing their majors in science, social studies and English language teaching were higher than those attending the CEIT program. This result may be due to the CEIT program involving more activities to develop students' strategy use. Schraw, Crippen and Hartley (2006) emphasized that strategies involving the use of self-regulating skills and motivational beliefs positively affected students' learning of science. Finally, the prospective science teachers also had higher total scores in SRLSS than the participants studying at the remaining departments, except for preschool teaching, mathematics teaching, and GPC. Self-regulation skills include students' cognition and metacognition strategies, as well as effort management and control. Therefore, this finding might be related to these four majors engaging students in activities that require the use of cognition and metacognition, organization, and control. On the other hand, the participants' scores in the subscale of motivation and taking action to learn did not statistically significantly differ according to their departments. In a previous study, Gömleksiz and Demiralp (2012) reported that the prospective teachers attending art, science, social studies, Turkish language and mathematics teaching and CEIT departments agreed with a higher number of statements included in the subscale of motivation and taking action to learn, and they also had more positive views concerning strategy use and evaluation compared to the prospective teachers doing their majors in classroom teaching.

When the prospective teachers' SRLSS scores were examined according to their grade levels, it was found that the first- and fourth-graders had higher scores in strategy use and evaluation than the second-graders, and the fourth-graders scored higher in dependency in learning compared to the second-graders. For the overall scale, it was similarly determined that the first- and fourth-grade students had higher scores than the second-grade students. On the other hand, there was no statistically significant difference in the prospective teachers' subscale scores in motivation and taking action to learn, and planning and goal-setting according to their grade levels. This finding may be related to the first-graders having recently taken the university entrance exam and the fourth-graders preparing for job placement exams and employment. In contrast, in their study investigating the effect of university education on the students' self-regulated learning skills, Sağırılı, Çiltaş, Azapağası, and Zehir (2010) reported that there were differences between the first-graders and fourth-graders in terms of these skills in favor of the former.

In terms of the gender variable, a significant difference was found in favor of the female prospective teachers regarding the overall SRLSS scores and all subscale scores. The traditional role of women giving them more responsibilities in jobs and situations requiring planning, problem-solving, and strategy use, and resulting in their higher exposure to such situations from a young age may have contributed to the development of these skills in the female participants. Similarly, İğci and Özdemir (2017), Weis, Heikamp and Trommsdorff, (2013), and Ducwort and Seligman (2006) observed a significant relationship between gender and self-regulated learning skills in favor of female students.

In contrast, Gömleksiz and Demiralp (2012) and Sağrılı and Azapağası (2009) detected no significant difference in terms of the overall SRLSS scale and subscale scores according to the gender variable.

Considering the type of high school completed, the strategy uses and evaluation scores of the prospective teachers that had finished basic high school were higher compared to those that had completed Anatolian or teachers' high school. However, there was no significant difference in relation to the remaining subscales and the overall scale. This is actually an expected result considering that in Turkey, the concept of basic high school emerged with the closure of private teaching institutions and their conversion to private establishments called basic high schools. Thus, these high schools continue to practice teaching using preparatory classroom techniques, mostly involving measurement and evaluation through tests. This may have contributed to the development of the prospective teachers' strategy use skills.

Examining the SRLSS scores of the prospective teachers according to their age, a positive relationship was found between age and subscale scores in motivation and taking action to learn and dependency in learning. However, there was no significant relationship between age and the other subscales (planning and goal-setting, and strategy use and evaluation) or the overall scale.

No significant difference was found when the self-regulated learning skills of the prospective teachers were analyzed according to their parents' (mother, father) education level. Self-regulated learning skills have a very complex structure affected by environment. As the closest environment, family is important in enriching and organizing the environment around children and young individuals. It can be stated that parents with a high education level create a family environment that provide children with a system to control their own thoughts and actions, and they also set examples for their children. Similarly, families with low education levels may also contribute to the development of these skills without even realizing by giving their children more responsibilities due to their traditional family attitudes. Therefore, it can be concluded that the education level of parents does not cause any difference in terms of the students' self-regulated learning skills. İğci and Özdemir (2017) obtained similar results in their study.

Finally, when the self-regulated learning skills of the prospective teachers were analyzed according to their socioeconomic levels, there was no significant difference. It was observed that the income status of the family was not effective in the development of the prospective teachers' self-regulated learning skills. It can be stated that the economic status of family would neither contribute to nor hinder students' development of this skill and active participation in their self-learning processes. This is supported by the results reported by İğci and Özdemir (2017).

The limitations of this study are as follows:

- The study is limited to prospective teachers studying at a state university education faculty in the province of Istanbul in the 2018-2019 academic year.
- This education is limited to 12 departments in the faculty of education and prospective teachers in the 1st, 2nd, 3rd and 4th grades of those departments.
- Another limitation of the study is the use of data obtained from the Self-Regulated Learning Skills Scale developed by Turan (2009) and the personal information form developed by the researchers.

In line with the results obtained from this study, the following recommendations are made:

- Increasing the numbers of studies to be conducted with teachers and prospective teachers who have great importance in developing students' self-regulated learning skills.
- Conducting mixed-methods research using both quantitative and qualitative methods.
- Organizing more practical, laboratory- and workshop-oriented training in vocational education to develop all components of the prospective teachers' self-regulated learning skills.
- Conducting studies to investigate in-service teachers' self-regulated learning skills and the related components.
- Adopting various practices and teaching techniques other than the conventional method for the measurement and evaluation of the self-regulated learning skills of prospective teachers.

- Promoting the awareness and ability of prospective teachers during their university education to create environments in which to develop their future students' self-regulated learning skills.

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